



INSTITUTO
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DE LISBOA

Marine scientific research as a mechanism for sustainable
management of coastal and marine resources in Guinea-Bissau

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Mestrado em Governação e Sustentabilidade do Mar

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Coimbra (CES-UC)

April 2026



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School of Social Sciences and Humanities

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Dedication

I dedicate this work to all people and organisations who fight for ocean sustainability, working to create peaceful relations between present and future generations. Your dedication establishes a path toward a fair society that brings health benefits and economic growth to every person. Your leadership will motivate people to take specific actions to defend planetary life and to establish sound governance systems to safeguard oceans for future generations.

Acknowledgments

I offer my deepest and eternal gratitude to God for His constant love, guidance, and boundless grace throughout my entire existence. The wisdom, strength, and numerous blessings from God have enabled me to achieve this milestone. His mercy helped me to succeed in every challenge and overcome every obstacle that stood in my way. All glory and honour belong to Him.

I am deeply grateful to my supervisors, PhD Cátia Miriam Casta and PhD Joana Vaz de Sousa, for their exceptional guidance and expertise, as well as their continuous support, which enabled me to complete this research. Their valuable feedback and motivational support helped me determine my research path, leading me to pursue academic success.

I extend my appreciation to all members of the master's Programme in Governance and Sustainability of the Sea at ISCTE–Lisbon University Institute who work as faculty and staff. Their academic leadership and mentoring activities created an environment that enabled me to develop my intellectual abilities during my time at this educational institution. The program has provided me with both academic knowledge and skills in sustainable development, enabling me to address complex marine and coastal sustainability issues.

I want to thank the Office for Transversal Competence for providing me with the valuable training sessions through the ISCTE department. I am particularly thankful to PhD João José Paiva Monteiro for his guidance and support. The training program has developed me into an adaptable professional who delivers value across different professional domains.

I want to express my sincere gratitude to all my teachers and professors for their support throughout my academic journey. Your dedication to teaching, combined with your knowledge and professionalism, has been invaluable to my professional development.

I also want to thank *Camões, Instituto da Cooperação e da Língua, I.P.*, for the financial scholarship support that helped me complete this work by providing the resources I needed.

I am deeply appreciative of the support and guidance provided by the Project Margins – *People, Rice, and Mangroves at the Peripheries: Hybridised Interfaces in Contestation in a Changing World*. The Project experience has delivered substantial knowledge and skill development, deepened my understanding of intricate socio-ecological systems, and enhanced my research capabilities. The academic and professional development received essential support from the Project through its collaborative environment and mentorship program. Likewise, I am grateful to the Organisation for the Defence and Development of Wetlands in Guinea-Bissau (ODZH), where I worked as a field technician, and whose work and experience gained, direct contact with coastal ecosystems, and interaction with professionals committed to environmental conservation were fundamental to my professional growth as a researcher.

The research became possible through the assistance of institutions and individuals who collaborated in Guinea-Bissau. I am deeply appreciative of the Ministry of Fisheries and Maritime Economy (MPEM), Institute of Biodiversity and Protected Areas (IBAP), National Institute for Fisheries and Oceanography Research (INIPO), National Institute for the

Supervision of Fishing Activities (INFISCAP), Coastal Planning Office (GPC), and National Institute for Studies and Research (INEP) for their cooperation during my field research.

I extend my gratitude to my program colleagues, who provided essential support through their friendship and academic discussions throughout the academic year.

I especially thank my godfather, Adilson Quadê, who always believed in me, for his constant support and encouragement, for his much-appreciated words of advice to stay strong in this fight and to make the fight the best weapon to face the future, and who encouraged me to follow this path, in addition to being an inexhaustible source of inspiration to me.

I want to express my deepest gratitude to my family, who have always supported me with their love, encouragement, and patience throughout my life. Their trust in me has become the foundation that keeps me strong and focused on my goals. This achievement belongs to my family members as much as it does to me.

I want to thank my mother, Helena Gunhi, for supporting me so many times, with such firmness that it took much struggle to overcome, and for being such a special person in my life, to whom I owe an outstanding debt. Likewise, I would like to thank and honour my father, Mário Camala, whose absence is indescribable and whose words cannot express how much he inspired me in doing this work. Thank you very much indeed!

In the memory of my aunt 'Sábado Badinca.'

Abstract

This dissertation critically examines the role of Marine Scientific Research (MSR) in supporting the sustainable management of coastal and marine resources in Guinea-Bissau between 2000 and 2025. The study is grounded in debates on the Blue Economy, ocean governance, and sustainability, with a focus on aligning scientific knowledge, national policymaking, and international fisheries agreements. Adopting a mixed-methods approach guided by the PRISMA 2020 protocol, the research integrates systematic review data from international databases (Scopus, Web of Science, Overton). It is complemented by national reports and four interviews with experts involved in marine research and management. Information was analysed with MAXQDA 24. Findings reveal that fragmented institutional structures, limited monitoring systems, weak enforcement capacity, insufficient data management, and the persistence of illegal, unreported, and unregulated (IUU) fishing undermine sustainability efforts. Nevertheless, MSR has been instrumental in identifying ecological and resource-depletion trends, informing management reforms, guiding the development of governance instruments such as the EU-Guinea-Bissau Sustainable Fisheries Partnership Agreements (SFPAs), and fostering dialogue among science, policy, and local communities. The study argues that integrating MSR into national decision-making, reinforcing research infrastructure, promoting participatory governance, and strengthening regional cooperation are essential for adaptive, inclusive, and evidence-based management of fisheries, mangroves, and related ecosystems. The study concludes that MSR is important for strengthening scientific endeavours in the country and can also contribute to strategic governance mechanisms that can provide policy-making guidance despite the recent political instability. It recommends reinforcing ecosystem-based management, improving monitoring and control systems, and ensuring that MSR outputs are systematically integrated into national policies to promote sustainable resource use, food security, and biodiversity conservation.

Keywords: Coastal and Marine Resource Management; Governance; Guinea-Bissau; IUU Fishing, Marine Scientific Research; Sustainable Development Goal 14.

Resumo

Esta dissertação examina criticamente o papel da Investigação Científica Marinha (ICM) no apoio à gestão sustentável dos recursos costeiros e marinhos na Guiné-Bissau entre 2000 e 2025. O estudo fundamenta-se em debates sobre a Economia Azul, a governança oceânica e a sustentabilidade, com o foco no alinhamento entre o conhecimento científico, a formulação de políticas nacionais e os acordos internacionais de pesca. Adotando uma abordagem de métodos mistos, guiada pelo protocolo PRISMA 2020, a investigação integra dados de revisões sistemáticas de bases de dados internacionais (Scopus, Web of Science, Overton). É complementada por relatórios nacionais e quatro entrevistas com especialistas envolvidos em investigação e gestão marinha. A informação foi analisada no software MAXQDA 24. Os resultados revelam que estruturas institucionais fragmentadas, sistemas de monitorização limitados, capacidade de fiscalização fraca, gestão de dados insuficiente e a persistência da pesca ilegal, não declarada e não regulamentada (INN) comprometem os esforços de sustentabilidade. No entanto, a ICM tem sido fundamental na identificação de tendências ecológicas e de esgotamento de recursos, fornecendo informações para reformas de gestão, orientando o desenvolvimento de instrumentos de governança, como os Acordos de Parceria para a Pesca Sustentável (SFPA) entre a UE e a Guiné-Bissau, e promovendo o diálogo entre a ciência, a política e as comunidades locais. O estudo argumenta que a integração da ICM na tomada de decisões nacionais, o reforço da infraestrutura de investigação, a promoção da governança participativa e o fortalecimento da cooperação regional são essenciais para a gestão adaptativa, inclusiva e baseada em evidências da pesca, dos mangais e dos ecossistemas relacionados. Conclui que a ICM é importante para fortalecer os esforços científicos no país e também pode contribuir para mecanismos de governança estratégica que fornecem orientação para a formulação de políticas, apesar da recente instabilidade política. Recomenda-se o reforço da gestão baseada em ecossistemas, a melhoria dos sistemas de monitoramento e controle e a garantia de que os resultados da ICM sejam sistematicamente integrados às políticas nacionais para promover o uso sustentável dos recursos, a segurança alimentar e a conservação da biodiversidade.

Palavras-chave: Gestão de Recursos Costeiros e Marinhos; Governança; Guiné-Bissau; Pesca INN; Investigação Científica Marinha; Objetivo de Desenvolvimento Sustentável 14.

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Acronyms

AIS – Automatic Identification System

AtlantNIRO – Atlantic Research Institute of Marine Fisheries and Oceanography

BE – Blue Economy

CCLME – *Ecossistema Marinho de Grandes Correntes das Canárias* (Canary Current Large Marine Ecosystem)

CFP – Common Fisheries Policy

CIPA – *Centro de Investigação Pesqueira Aplicada* (Centre for Applied Fisheries Research)

COPACE – *Comité des Pêches pour l'Atlantique Centre-Est* (Fisheries Committee for the Central Eastern Atlantic)

EBM – Ecosystem-Based Management

EEZ – Exclusive Economic Zone

EU – European Union

FAO – Food and Agriculture Organisation of the United Nations

GPC – *Gabinete de Planificação Costeira* (Coastal Planning Office)

GT – Gross Tonnage

IBAP – *Instituto da Biodiversidade e das Áreas Protegidas* (Institute of Biodiversity and Protected Areas)

ICCAT – The International Commission for the Conservation of Atlantic Tunas

IEO – *Instituto Espanhol de Oceanografia* (Spanish Institute of Oceanography)

INEP – *Instituto Nacional de Estudos e Pesquisa* (National Institute for Studies and Research)

INFISCAP – *Instituto Nacional de Fiscalização das Atividades de Pesca* (National Institute for the Supervision of Fishing Activities)

INIPO – *Instituto Nacional de Investigação das Pescas e Oceanografia* (National Institute for Fisheries and Oceanography Research)

IUCN – International Union for Conservation of Nature

IUU – Illegal, Unreported, and Unregulated (Fishing)

MCS – Monitoring, Control, and Surveillance

MPAs – Marine Protected Areas

MSR – Marine Scientific Research

MSY – Maximum Sustainable Yield

PESCAO – *Programa para Melhoria da Governança Regional de Pescas na África Ocidental* (Improved Regional Fisheries Governance in Western Africa)

PRCM – *Le Partenariat Régional pour la Conservation de la zone côtière et Marine* (The Regional Coastal and Marine Partnership)

RAMPAO – *Réseau régional d'Aires Marines Protégées en Afrique de l'Ouest* (Regional Network of Marine Protected Areas in West Africa)

RFMOs – Regional Fisheries Management Organisations

RGB – *República da Guiné-Bissau* (Republic of Guinea-Bissau)

SDGs – Sustainable Development Goals

SEA – *Secretaria de Estado do Ambiente* (Secretary of State for the Environment)

SEPEM – *Secretaria de Estado das Pescas e Economia Marítima* (Secretary of State for Fisheries and Marine Economy)

SFPAs – Sustainable Fisheries Partnership Agreements

SRFC – Sub-Regional Fisheries Commission

SSESD – Secretary of State for Environment and Sustainable Development

TAC – Total Allowable Catch

UN – United Nations

UNCLOS – United Nations Convention on the Law of the Sea

UNDPGRGB – United Nations Development Programme and Government of the Republic of Guinea-Bissau

UNESCO – United Nations Educational, Scientific, and Cultural Organisation

UNFSA – United Nations Fish Stocks Agreement

VMS – Vessel Monitoring System

WARPF – West Africa Regional Fisheries Program

Introduction

The ocean has become a central theme in contemporary sustainability discourse and debates, particularly regarding the tensions between exploitation and protection (Ertör & Hadjimichael, 2020). The Blue Economy (BE) framework recognises the ocean as a source of wealth to combat worldwide poverty and social disparities while protecting it from climate change, pollution, overfishing, and habitat destruction (Midlen, 2021). In some instances, the expansion of economies that are highly exploitative of the ocean threatens coastal communities' ability to access vital marine resources, which sustain their food security and social stability (Bennett et al., 2021). A practical solution to these problems requires governance policies that establish international partnerships for the sustainable management of aquatic ecosystems and that ensure coastal communities' access to their food resources (Valdés et al., 2021).

Achieving the Sustainable Development Goals (SDGs) depends on sustainable ocean resource management practices. The BE concept has begun to appear in the national policies of multiple countries, as the world has increasingly focused on ocean resources (Das, 2023). The so-called developed countries focus on innovation and blue technologies, whereas developing nations focus on combating overfishing and illegal, unreported, and unregulated (IUU) fishing (Østhagen et al., 2022). In 2012, the European Union (EU) launched Blue Growth, a strategic plan to support the sustainable exploitation of the marine and maritime sectors (Koundouri & Giannouli, 2015). The BE, Blue Capital, and Blue Growth have become fundamental concepts in ocean governance policy discussions about future ocean management (Ertör & Hadjimichael, 2020). The BE strategy supports multiple sectors that generate employment opportunities and sustainable expansion through aquaculture, coastal tourism, and ocean energy development, while creating knowledge platforms, legal frameworks, and security systems through maritime spatial planning and integrated maritime surveillance (Koundouri & Giannouli, 2015). While such strategies shape ocean governance, other perspectives question the very limits of growth.

Critical scholars and activists raised doubts about Blue Growth's ability to achieve genuine sustainability and social justice. Ongoing discussions on degrowth have utilised questions such as access to food and land to explore material and energy consumption in areas including agriculture, agroecological principles, food security, and cooperative food systems (Scheidel et al., 2021). Greta Thunberg popularised the growth criticism through her UN Climate Action Summit speech on September 23, 2019, when she criticised 'eternal economic growth' fairy tales (Ertör & Hadjimichael, 2020). In their article, Ertör and Hadjimichael introduced the term

‘Blue degrowth’. They presented a framework advocating a participatory vision that prioritises community rights, small-scale and cooperative management of marine resources over capitalist, exploitative, and neoliberal approaches to ocean use. This approach seeks to steer political debates about the governance of seas and oceans toward exposing and challenging the failures, injustices, and harmful effects of blue growth across political and socioecological dimensions.

Scientific progress allows for a broader understanding of the ocean’s natural ecosystems and human-made environmental changes (Duarte, 2023). Scientific research over the last 50 years has produced significant knowledge about coastal and aquatic ecosystems, underscoring their need for sustainable protection (FAO, 2020b), and creating economic and academic opportunities (Kowalski & Antunes, 2023). The conservation of coastal and marine ecosystems depends on marine scientific research (hereafter MSR), which enables ecosystem monitoring, risk identification, sustainable resource management, public education, and the development of innovative solutions to modern environmental challenges (Duarte, 2023). Evidence-based information from MSR enables policymakers to develop sustainable management strategies for coastal and aquatic resources (Kowalski & Antunes, 2023).

MSR research typically examines human-made environmental problems, coexistence scenarios, the impacts of climate change, and trends in species populations, among other topics. An approach stemming from scientific research is the Ecosystem-Based Management (EBM), defined as a holistic approach to natural resource management that considers ecosystems as integrated socioecological systems, rather than focusing on individual species or sectors (O’Higgins et al., 2020). It aims to maintain ecosystem structure, functions, and services by accounting for ecological interactions, human activities, and governance processes across appropriate spatial and temporal scales (Delacámara et al., 2020).

Recognising that scientific knowledge is inherently incomplete, EBM relies on systems thinking, adaptive management, and cross-sectoral coordination to address complex and uncertain environmental challenges (O’Higgins et al., 2020). In the coastal and marine context, the complexity and connectivity of aquatic ecosystems preclude the use of a single model. Instead, EBM promotes integrated and adaptive management frameworks that address dynamic ocean processes and multiple human uses, while accounting for ecological linkage, cumulative impacts, and their interdependence with coastal communities.

This dissertation critically examines MSR outputs, considering the identified problems and proposed solutions to achieve marine sustainability in Guinea-Bissau. It also discusses the contributions of MSR to the sustainable management of the country's coastal and marine resources, namely, the research examines how, and to what extent, scientific breakthroughs have informed the development of national policies to support the EU-Guinea-Bissau Sustainable Fisheries Partnership Agreements (SFPAs) and whether these policies are aligned with Sustainable Development Goal 14 (Life Below Water).

The work is divided into six chapters. In addition to the introductory section that situates the topic, Chapter 1 begins with a section on Research Background, Rationale, and Objectives that explains the study's relevance. In Chapter 2, the literature review outlines the evolution of MSR, its legal and governance framework, sustainability and biodiversity dimensions, IUU fishing challenges, cooperation mechanisms, knowledge gaps, and EU-Guinea-Bissau Fisheries Agreements. Chapter 3 explains the methods used to gather and analyse data. Chapter 4 reports the findings that emerged from the research through the analysis of existing literature and empirical data. Chapter 5 discusses and interprets research results. Chapter 6 presents the main conclusions. The research offers multiple recommendations outlining specific actions and standards to guide research and promote sustainable resource management not only in Guinea-Bissau but also relevant across West African contexts.

1. Research Background, Rationale, and Objectives

1.1 Background and Context

Guinea-Bissau is part of West Africa and is bordered by Senegal to the north, Guinea to the south and east, and the Atlantic Ocean to the west (Lemenkova, 2024). The total area of Guinea-Bissau is 36,125 km², of which 22% is water bodies, including rivers and wetlands. This sub-humid region experiences two distinct seasons, characterised by different rainfall patterns. Rainfall is high in the southwestern coastal area, then decreases toward the northern coastal regions, and continues to decline until it reaches its lowest point in the interior region. The Bolama-Bijagós Archipelago¹ stands as a major coastal landmark, including more than 88 islands and islets (Catry et al., 2009; Sá, 2017; SSES, 2011) while being protected as a UNESCO Biosphere Reserve since 1996 and a Ramsar site since 2014 (Correia et al., 2017).

Guinea-Bissau has a coastline of approximately 274 km, with a continental shelf extending over an estimated 45,000 km² within its exclusive economic zone (EEZ), which covers about 106,000 km². This is characterised by predominantly shallow depths, and its continental shelf is among the largest in West Africa (Intchama et al., 2018; SEP, 2014). The marine ecosystems of this area maintain high fishery resource diversity and abundance because of their shallow waters (SEP, 2014) and high primary production due to phenomena such as upwelling and freshwater input. Consequently, these abundant fishery resources offer significant opportunities for fishing activities (CIPA, 2019; Sá, 2017; SEP, 2014).

The country's hydrographic network, bounded by the rivers Geba, Cacheu, Corubal, Mansoa, Cacine, and Tombali, teems with diverse flora and fauna. Internationally, it is regarded as a bastion of diversity and richness. On October 27, 1995, Guinea-Bissau ratified the Convention on Biological Diversity (CBD), a treaty designed to protect and promote the sustainable use of biodiversity among its signatories (IBAP, 2014; SEA, 2016). Moreover, the establishment of protected areas for resource conservation is celebrated as a national milestone. The National System of Protected Areas (SNAP) currently comprises seven sites spanning

¹ The Bolama-Bijagós Archipelago was officially designated a Natural World Heritage Site by the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) on July 13, 2025.

26.3% of the nation's land area (750,000 ha), including 12.4% marine and 13.9% terrestrial zones. These proportions of protected land align with the CBD's Aichi Targets² (RGB, 2019).

Extending southwest of the Bijagós Archipelago (**Figure 1.1**) three distinct fishing zones are identified based on their depth: (a) a shallow zone, less than 10 metres deep, covering over 200 km² and accessible to artisanal vessels; (b) an intermediate zone, with depths ranging from 10 to 20 metres and approximately 28,000 km², primarily exploited by distant-water³ industrial fleets; and (c) a deep zone, ranging from 20 to 200 metres, with irregular and rugged seabed, and abundant resources (CIPA, 2019; INIPO, 2025).

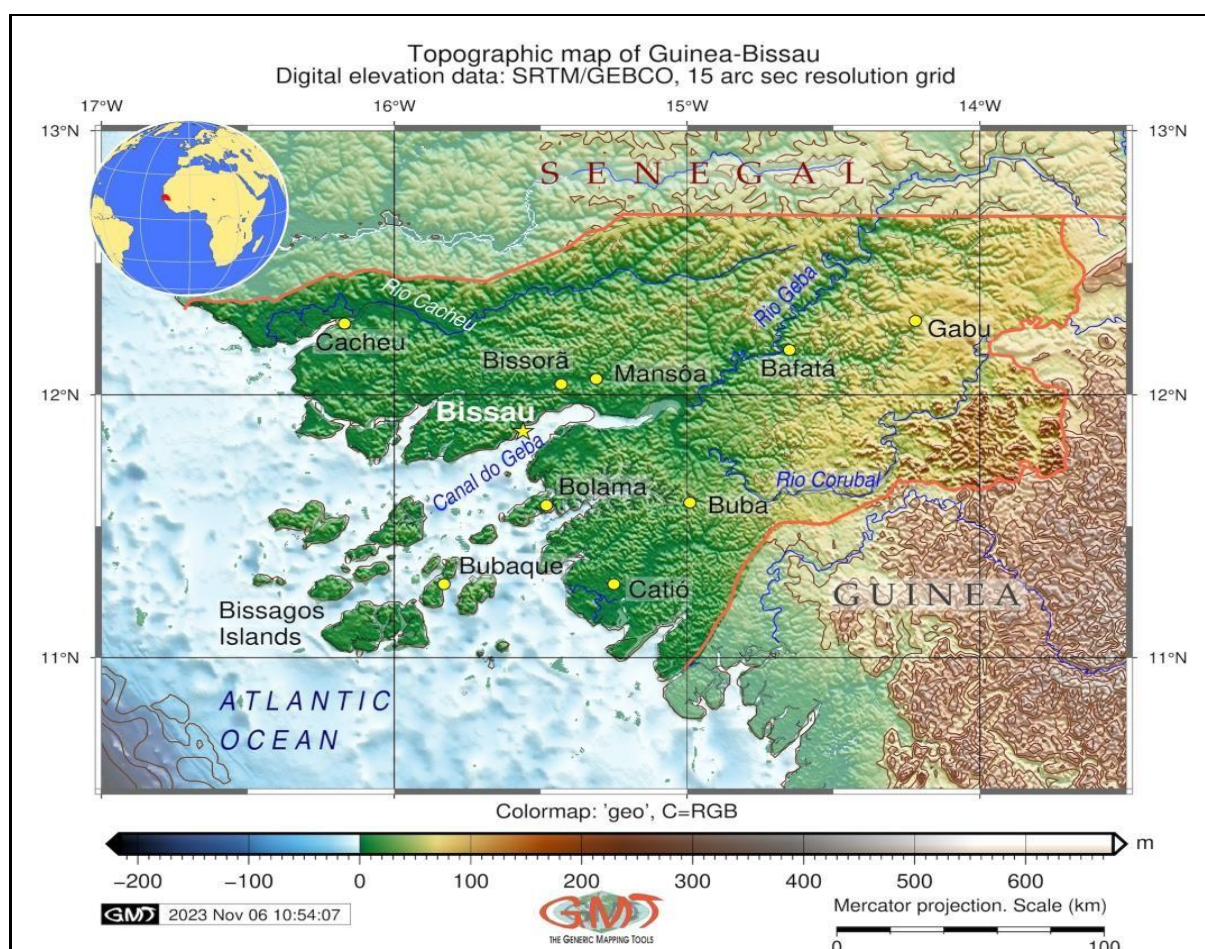


Figure 1.1 – Topographic map of Guinea-Bissau, West Africa. Source: Polina Lemenkova, 2024. DOI: 10.2478/trser-2024-0008.

² Aichi Biodiversity Targets. Access the [link here](#).

³ The term 'Distant-water' refers to any operator or vessel that does not belong to Guinea-Bissau yet operates within the country's waters to exploit its coastal and/or marine resources.

The country is part of the Canary Current Large Marine Ecosystem (CCLME), which constitutes one of the world's most important upwelling systems and one of the most productive ecosystems, serving as a reservoir of high marine biological diversity (De Barros & Carvalho, 2021; Gomes et al., 2024). The CCLME comprises diverse coastal and marine habitats, including wetlands, estuaries, seagrass beds, mangroves, and coral communities, with three distinct zones: 1) a northern subtropical upwelling zone, off the northern coast of Mauritania, characterised by limited fluvial inputs; 2) a southern tropical zone, centred of the coast of Guinea-Bissau and extending from Senegal to Guinea, characterised by the predominance of estuarine and mangrove ecosystems; 3) a western oceanic zone spanning subtropical to tropical regions, including the Canary Islands (Spain) and Cabo Verde waters (CCLME Project, 2016).

The Coastal State's authority over maritime areas depends on the distance from its baseline, enabling it to maintain sovereignty over resources while exercising control over these areas, particularly the territorial sea, the EEZ, and the continental shelf. The United Nations Convention on the Law of the Sea (UNCLOS, 1982) provides that a coastal State's sovereignty extends over the territorial sea, including its airspace, seabed, and subsoil (Article 2), establishes the EEZ beyond the territorial sea under a specific legal regime governing coastal State rights and the freedoms of other States (Article 55), and defines the continental shelf as the seabed and subsoil extending to the outer edge of the continental margin or up to 200-nautical miles where the margin does not reach that distance (Article 76). **Figure 1.2** illustrates the various maritime zones under UNCLOS.

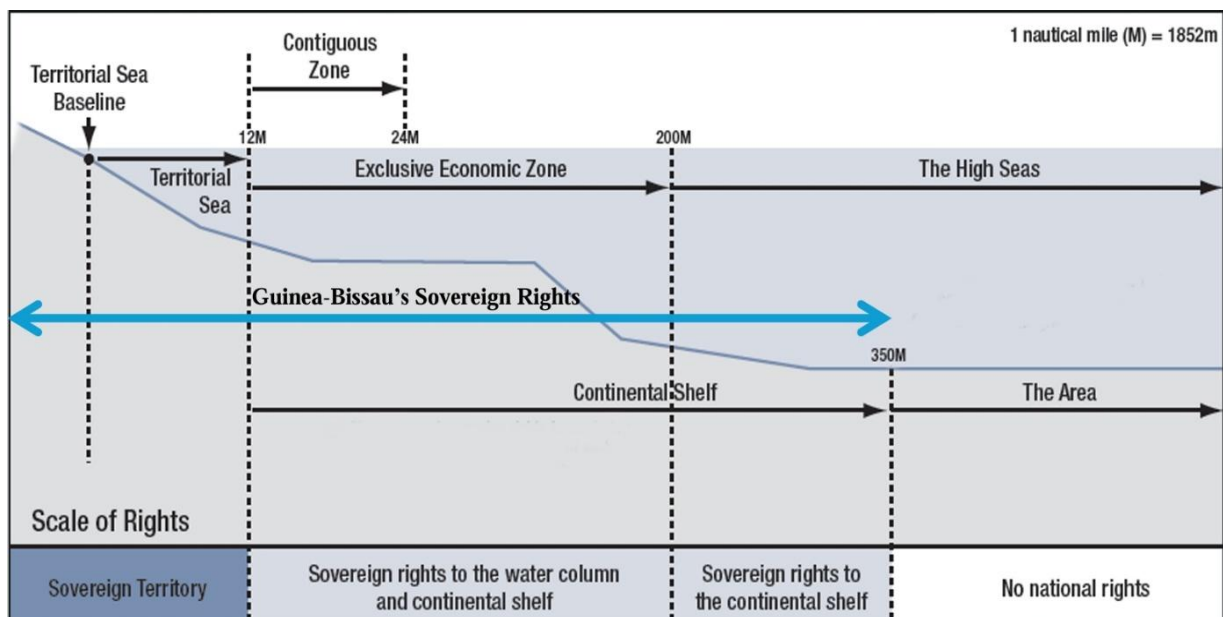


Figure 1.2 – Maritime boundaries according to UNCLOS.

Source: <https://www.vliz.be/projects/marinegeneticresources/united-nations-convention-law-sea.html>.

Guinea-Bissau has two primary fishing modalities: industrial and artisanal fishing. Industrial fishing is carried out beyond 12 nautical miles in the EEZ by vessels operating under the framework of fishing agreements. In contrast, artisanal fishing, which remains anchored in rivers, estuaries, or the territorial sea, uses either the traditional dugout non-motorised canoe or outboard-motorboats limited to sixty horsepower (CIPA, 2019; INIPO, 2025; Sobrino et al., 2023, 2024). Within Guinea-Bissau's zone, industrial fisheries are organised under four licence types that correspond to the species each fleet pursues: shrimp trawling, cephalopod trawling, demersal trawling, and pelagic trawling. Shrimp-trawl nets are cut to catch crustaceans, shrimp, and crabs. Cephalopod nets are fashioned to capture octopus, cuttlefish, and squid. Demersal vessels go after fish that live close to the seabed, while pelagic trawlers target the open-water species, mostly sardines and horse mackerel (Sobrino et al., 2023).

Fishing pressure is mainly directed toward high-value demersal species⁴, such as shrimp (*Penaeus spp*), cuttlefish (*Sepia spp*), octopus (*Octopus vulgaris*), black hake (*Merluccius spp*), snappers (*Lutjanus spp*), croaker (*Pseudotolithus spp.*), and others (CIPA, 2019; INIPO, 2025; SEPEM, 2014). In the regional context, resources are threatened by intensive exploitation from industrial and artisanal fleets, inadequate fisheries management policy, and insufficient monitoring of fleet activities (SEPEM, 2014).

Since Guinea-Bissau has no fleet, it generates revenue by issuing fishing licenses to distant-water fleet operators. Fishing licenses have been issued to the EU since the 1980s. The 2024-2029 EU-Guinea-Bissau SFPA Protocol outlines the scheme's aim to strengthen conservation and environmental sustainability through the judicious use of Guinea-Bissau's fisheries. In practice, this means restricting fisheries stocks that could avoid overexploitation and comply with the latest scientific advice, while also emphasises the need for greater transparency on fishing effort in national waters (EC, 2024).

Resource exploitation has become a growing concern for stakeholders seeking to develop sustainable management plans (Sá, 2017). However, the number of vessels operating in Guinea-Bissau's national waters remains high. In 2021 and 2022, a total of 198 and 169 industrial units of various nationalities operated within Guinea-Bissau's EEZ. In both years, demersal trawlers were the most common, with 88 vessels recorded in 2021 and 71 in 2022. They were followed by tuna-catching vessels, recording 45 in 2021 and 41 in 2022. Trawlers targeting cephalopods

⁴ Demersal fish, also called bottom fish, live on or near the bottom of lakes or seas (demersal zone). They contain less oil than pelagic fish, which live in surface waters (pelagic zone). Access the [link here](#).

reported 38 licences in 2021 and 31 in 2022. Ships targeting crustaceans accounted for 20 in 2021 and 22 in 2022, whereas those pursuing small pelagic stocks decreased from 19 in 2021 to 11 in 2022, respectively (Sobrino et al., 2023). In 2023, there were 149 licensed industrial vessels (Sobrino et al., 2024).

The high population density of people inhabiting coastal areas leads to competing interests and disputes over who controls space and how resources are used (Said & Sá, 2012; Sales et al., 1993). Across scales, ecological and biological processes continually reshape marine ecosystems, with mangroves arguably the most productive of all coastal wetlands (Ison et al., 2024). Closer to the water's edge, the West African coastline is overwhelmingly defined by mangrove ecosystems, which serve as the primary support of the communities that fish, practice rice farming, appeal to tourists, collect wild resources, hunt, keep bees, raise livestock, and practice arboriculture (Sané et al., 2021). These mangrove belts sit at the ever-shifting interface between land and sea, a zone renowned for its soaring productivity and dynamic environmental conditions (Sousa et al., 2023). Their gross primary production (GPP) can be up to five times higher than that of other ecosystems (Choudhary et al., 2024).

Guinea-Bissau, with an estimated population of two million people, is classified as a Small Island Developing State (SIDS). In 2019, it sits among the world's nations, with 67 % of its residents living in absolute poverty. Its economy relies heavily on agriculture, with cashew nuts accounting for a significant share of exports and approximately a fifth of Gross Domestic Product (GDP), although this share can fluctuate with prices (Naidoo & Kodjo, 2023; UNDPGRGB, 2019). Rice, by contrast, remains the staple, accounting for 62% of agricultural output and satisfying roughly three-quarters of the nation's grain consumption (Conde et al., 2024; Garbanzo et al., 2024). Nevertheless, domestic rice output remains below the nation's demand. Agricultural productivity is declining, largely due to inundation, accelerated soil erosion, and salinisation of fields. According to the World Bank's 2023 appraisal, the country was among the nations experiencing high levels of institutional and social fragility, which was further compounded by persistent sociopolitical instability (Naidoo & Kodjo, 2023).

Approximately 70% of Guinea-Bissau's residents are clustered in the coastal zone, where the average density is around 50 inhabitants/km². With high fertility rates, the population is growing approximately 1.9% per year, tightening resource constraints and deepening the economic challenges that future generations will inherit (UNDPGRGB, 2019). The Brundtland Report has long argued that sustainable development is a form of progress that meets the needs

of the present without compromising the ability of future generations to meet their own needs (UN Brundtland Report, 1987).

Therefore, coastal governance is a framework that steers the management of ever-changing dynamics, offering a decision-making grounded in policies, programmes, and regulatory tools while actively inviting stakeholder involvement to nurture sustainable development (Vega-Muñoz et al., 2022). These authors emphasise that addressing the challenges of coastal governance cannot rely solely on technical solutions. In this setting, the political decision-making process serves as the backbone of the governance system, integrating multiple knowledge streams while remaining aligned with international regulatory frameworks.

1.2 Problem Statement

Environmental degradation has become a global concern. At the community level, human endeavours incrementally reconfigure habitats, triggering ecological impacts. When those effects accumulate across territories, they give rise to predicaments, especially the rapid erosion of biodiversity and the intensification of climate change (O'Higgins et al., 2020), emphasising the colossal nature of these challenges, which often seem insurmountable given their far-reaching repercussions for well-being.

Guinea-Bissau faces a range of challenges in managing its marine resources, including weak policy enforcement, overexploitation of fisheries, a surge in IUU fishing, and an ongoing struggle to protect marine ecosystems and biodiversity. The lack of regulations and limited law enforcement in the fisheries sector has already driven fish stocks toward depletion. In contrast, damaging practices, notably transshipment⁵, serve as a conduit for illicit fish laundering (UNDPGRGB, 2019). Moreover, the illicit practice exacerbates unemployment and distress, prompting fishermen to turn to piracy. At the same time, institutions struggle with governance crises, and a lack of integrated coastal management hinders their ability to address a diversifying economy and the emerging challenges of climate change. The State's passivity in the face of these activities can be attributed not only to a lack of determination but, more

⁵ The operation involves transferring cargo between vessels at sea, potentially enabling the laundering of illegal catches into global markets.

importantly, to the inability of State institutions to address such significant transgressions. This inability is directly linked to the country's enduring political instability (Mendes, 2023).

In Guinea-Bissau, fisheries governance is primarily overseen by the Fisheries Control and Oversight Authority, in coordination with the Navy and Coastal Guard. Despite this, the country's capacity to patrol its EEZ and 88 islands is limited, with only a small fleet of rapid patrol boats. Although a Vessel Monitoring System (VMS) and four coastal surveillance centres have been set up with assistance, maritime surveillance still depends heavily on funding (Paes & Okafor-Yarwood, 2024). Moreover, despite investment in surveillance infrastructure and capacity-building, supported by the EU-Guinea-Bissau's SFPAs, progress in curbing IUU fishing within Guinea-Bissau's EEZ remains constrained by the reduced presence of monitoring authorities, a fallout of the political instability that plagued the early 2010s (SEPTEM, 2014).

The nation's limited resources for tackling IUU fishing are depleting its fish stocks, while unlicensed vessels continue to enter its waters (Sá, 2017). Across West Africa, the World Bank's West Africa Regional Fisheries Program (WARPF), covering Cabo Verde, Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Mauritania, Senegal, Sierra Leone, and The Gambia, aims to pull value out of marine resources by tightening fisheries governance, cracking down on IUU fishing, and boosting the added-value of its products (UNDPGRGB, 2019).

Another primary concern is bycatch, defined as the incidental capture of non-target species from different taxonomic groups that are legally permissible under the fishing licence but do not constitute the primary species of commercial interest. These catches of non-target species and taxonomic groups result from the low selectivity of the trawler gear used by fleets and from the fact that the species share the same habitats, regardless of the taxonomic group to which they belong (Sobrinho et al., 2023). Beyond the pressures created at sea, coastal ecosystems face additional pressures that further hinder resource management.

The accumulating changes along Guinea-Bissau's coast are threatening food security for the shoreline population, whose diets rely heavily on seafood as the primary protein source and rice as the fundamental staple (UNDPGRGB, 2019). Therefore, research is needed to address the critical knowledge gap in the scientific understanding of sustainable agricultural practices that are adapted to West Africa's diverse, context-specific conditions, as well as the factors guiding farmers' decision-making, so that these practices are both environmentally sustainable and effective at the local level context (Merkohasanaj et al., 2025).

According to the CBD⁶, the country's biodiversity status and trends are challenging, largely due to data scarcity. With a range of policy initiatives, current conservation efforts still fall short. The major hurdles, such as resource extraction, species extinctions, fragmented habitats, rampant deforestation, and the lack of validation for traditional knowledge, remain persistent challenges (SEA, 2016).

As a United Nations (UN) member, the nation, through its ministries, has drafted policies and signed onto a suite of international conventions and agreements (Baptista, 2017). However, on the governance side, these bodies have been recovering for years, emerging from various crises. The fragmentation of responsibility for coastal zone management across several entities has left national institutions insufficiently equipped to address the increasing diversification of the coastal economy, and even less capable of responding to the impacts of climate change (UNDPGRGB, 2019). Given these considerations, the development of the fisheries resource management plan incorporated the concerns of the partnership between institutions linked to the fisheries sector (CIPA, 2019).

Given the growing relevance of the oceans in the global sustainability debate, an integrated approach is needed that simultaneously recognises their economic potential, ecological vulnerability, and social implications. Guinea-Bissau faces challenges in the sustainable management of its coastal and marine resources, stemming from institutional weaknesses, unsustainable fishing practices, and climate change. In this context, MSR plays a potentially important role, serving as a strategic instrument to understand ecological dynamics, support evidence-based policymaking, and promote more inclusive and effective blue governance. Strengthening the connection among science, policy, and community is essential to ensure the conservation of aquatic ecosystems, food security, and the sustainable development of coastal populations, in line with the principles of UNCLOS and the United Nations SDGs.

1.3 Research Questions

Research questions are crucial in the research process because they compel the researchers to consider the most fundamental issues, namely, what the research aims to answer (Bell et al.,

⁶ Guinea-Bissau country profile of the Convention on Biological Diversity: access the [link here](#).

2022). Thus, this research addresses the following questions: i) What factors does MSR identify as constraining or challenging the sustainable management of coastal and marine resources in Guinea-Bissau? ii) What recommendations has MSR provided to inform policymaking and enhance governance strategies for managing coastal and marine resources in the country?

1.4 Research Hypotheses

Guinea-Bissau has significant potential to develop its maritime sectors through MSR, which can support effective resource management strategies by informing ecosystem and biodiversity status and identifying gaps and limitations in promoting sustainable resource management. Therefore, to maximise the potential of these areas and update the knowledge of the resources, this study proposes the following hypothesis: i) MSR has identified factors that constrain or challenge the sustainable management of coastal and marine resources in Guinea-Bissau, by generating data and knowledge on the status of resources, biodiversity, and ecosystems for better science-governance purpose; ii) MSR supports science-based policymaking by informing governance-oriented recommendations for the sustainable management of coastal and marine resources, integrating economic, ecological, and social development considerations.

1.5 Research Aims and Objectives

To address the research questions as well as to find the answer for the research hypotheses mentioned above and fill the existing knowledge gaps, this study aims to critically and comprehensively explore the role and contributions of MSR in identifying the factors hindering the formulation and implementation of strategies for sustainable management of coastal and marine resources in Guinea-Bissau from 2000 to 2025. More specifically, this study seeks to: i) identify the reported factors constraining or challenging the sustainable management of coastal and marine resources; ii) evaluate the role of MSR in EU-Guinea-Bissau Fisheries Agreements; iii) synthesise the main recommendations given by MSR for the sustainable coastal and marine resources management, as well as strengthening science-based governance.

This study focuses on the period after 2000. The year 2000 marked a new beginning for Guinea-Bissau, which had experienced a civil war from June 1998 up until September 1999. It

resulted in a major refugee crisis, with over 300,000 people displaced from conflict-affected areas. The overthrow of the government led by João Bernardo Vieira (Nino) and significant economic losses (estimated at approximately US\$170 million) (Kaczynski & Fluharty, 2002). The conflict prompted military interventions by other West African States, namely, Senegal and Guinea, as well as international actors. In this study, the post-conflict period marked the beginning of a new institutional and governance cycle for the country in managing its resources.

1.6 Research Justification

Guinea-Bissau has significant potential to develop its BE through the implementation of policies aimed at sustainable management of coastal and marine resources while preserving aquatic ecosystems. For example, policies and practices that restrict fish capture in jurisdictional waters, such as monitoring gear type and mesh size, are fundamental to preventing overfishing. However, these must be directed toward actors and practices that do not negatively impact national food security. Additionally, it is crucial to enforce regulations and implement effective strategies for marine protected areas, accompanied by robust monitoring to facilitate the recovery of ecosystems and marine biodiversity. Therefore, investing in MSR and fostering dialogue between science and society on sustainability, as well as the centrality of coastal and aquatic ecosystems to food security and biodiversity, is fundamental.

According to the literature, an important step is to define the Total Allowable Catch (TAC) as a primary output control (Borges, 2018; CIPA, 2019; Ding et al., 2023; INIPO, 2025; Sobrino et al., 2023, 2024). Given the limited scientific information available for cases such as Guinea-Bissau, the TAC should be defined based on the existing scientific evidence. Ideally, its determination requires knowledge of the total biomass, the population structure of the species, its ecological interactions, and data that can only be obtained through scientific research (Kaczynski & Fluharty, 2002; Kaczynski & Looney, 2000).

It is worth noting that Guinea-Bissau's fragility in combating IUU fishing affects resource management and increases pressure on fishery resources under national jurisdiction. Given the state of fishery resources and the need to preserve and enhance their value, it is essential to formulate a comprehensive management plan that establishes guidelines for improved governance and regulation of the sector. The plan should incorporate exploitation, protection, and conservation measures based on scientific data on resource status (CIPA, 2019). For these

reasons, MSR is an essential tool for shaping policies and practices in coastal nations such as Guinea-Bissau, where the economy and food security are highly dependent on these resources.

This study on MSR contributes to advancing the United Nations Sustainable Development Goals (SDGs)⁷, especially Goal 14th on ‘Life Below Water’ in Guinea-Bissau, as well as to the sustainable management of coastal and marine resources. This aligns closely with Target 14.2 by promoting the sustainable use of aquatic ecosystems and enhancing scientific knowledge and research capacity. It contributes to SDG 2 (Zero Hunger), specifically Target 2.4, by promoting resilient food systems in coastal communities that rely on fishing and mangrove-associated agriculture. This study also supports SDG 8 (Decent Work and Economic Growth), notably Target 8.4. It supports efforts to improve global resource-use efficiency, promote sustainable production and consumption, and implement measures to ensure that economic growth occurs without environmental harm. Moreover, in the context of climate change, the study supports SDG 13 (Climate Action), notably Target 13.1, by providing data that guides climate adaptation strategies in vulnerable coastal areas. Finally, it aligns with SDG 17 (Partnerships for the Goals) by fostering international collaboration and capacity building, particularly Target 17.6, which emphasises cooperation in science, technology, and innovation.

Theoretically, this study contributes to the emerging literature on blue governance and the BE in Africa by demonstrating how scientific knowledge production is intertwined with global and local power structures. Empirically, the study adds value by synthesising over two decades of data from international and national written sources and integrating qualitative insights from expert interviews to identify specific directions for strengthening science-based coastal and marine resource governance in Guinea-Bissau.

⁷ The United Nations SDG. Access the [link here](#).

2. Literature Review

MSR is essential for understanding the oceans' complex and dynamic systems and their interactions with the atmosphere, land, biosphere, and society. It also supports responses to current and emerging threats to ocean health and productivity. Evidence from MSR informs policy and management, strengthening the governance and conservation of marine resources (Coelho, 2024). The historical evolution of MSR highlights its growing relevance for understanding ocean systems and informing governance. However, the effective contribution of MSR depends on the legal and instrumental structures that regulate its practice.

2.1 MSR within the International Framework

Science-based governance is the cornerstone of any effort to manage marine resources sustainably. Making it work depends on cooperation among governments, research institutes, the private sector, local communities, and non-governmental organisations (NGOs), across all scales. It is these alliances that drive sustainable blue governance. The 1982 UNCLOS preamble stated that the challenges confronting the oceans are profound and must be tackled as a whole (Moreira, 2023). Nevertheless, it requires states to rely on available scientific evidence when formulating conservation and management measures to curb the overexploitation of marine living resources within their EEZs. Additionally, they must establish partnerships with subregional, regional, and global organisations to promote the sustainable use and long-term conservation of these resources (Okafor-Yarwood & Belhabib, 2020).

UNCLOS established MSR as both a right and a responsibility of States, thereby establishing the legal framework governing its conduct across marine spaces (UNCLOS, 1982) and providing a comprehensive basis for regulating State activities at sea (Nguyen & Vu, 2025). It underscores the role of scientific data in advancing marine knowledge and ensuring the sustainable use of ocean resources, governed by Part XIII of UNCLOS, which entitles all States to conduct research activities and obliges States and relevant international organisations to promote and facilitate them (UNCLOS, 1982). As determined, MSR must be conducted exclusively for peaceful purposes, use appropriate scientific methods and means, avoid unjustifiable interference with other legitimate uses of the sea, such as navigation and military operations, and comply with UNCLOS, including Part XII on marine environmental protection (Coelho, 2024; Nguyen & Vu, 2025).

The Decade of Ocean Science for Sustainable Development (2021-2030), ‘*The Science We Need for the Ocean We Want*’, is working under the UNCLOS to develop innovative solutions that will create stronger science-based policies and better science-policy connections at all levels to enhance blue governance integration (Guan et al., 2023). To advance these goals and strengthen global dialogue, the 2022 UN Ocean Conference adopted the theme ‘*Scaling up ocean action based on science and innovation for the implementation of goal 14: stocktaking partnership and solutions.*’ The conference brought together more than 6,000 participants, including twenty-four heads of state and government and 2,000 representatives from civil society (Kowalski & Antunes, 2023). Co-hosted by Kenya and Portugal, the conference aimed to mobilise actions by advancing much-needed, science-based, and innovative solutions to launch a new chapter of global ocean action.

2.2 MSR and Coastal and Marine Environments

The concept of ecosystem services is commonly framed regarding the benefits they provide, reflecting a utilitarian and anthropocentric perspective. At this point, MSR may pursue different objectives. On the one hand, it may focus on specific marine resources, aiming to define ownership and conditions of use. On the other hand, it may prioritise the conservation of natural elements for their intrinsic ecological value and role in maintaining environmental balance (Kowalski & Antunes, 2023). In this perspective, MSR provides a foundational basis for understanding the complexities of marine ecosystems (Nguyen & Vu, 2025).

The coastal and marine environment is a vast and complex ecosystem essential to sustaining life on Earth, providing habitats for diverse species, regulating climate, and supporting the livelihood of many communities (Nguyen & Vu, 2025). Enhancing understanding of the marine environment would also bring significant practical benefits, including strengthening coastal states’ capacity to address climate change and anthropogenic pollution, supporting sustainable management of resources, and revealing the potential value of previously unknown seabed biological resources, which could play an important role in the future (Andreone, 2017).

Regional and international institutions and agreements reinforce ecosystem-based ocean governance. Regional Fisheries Management Organisations (RFMOs) and the United Nations Environmental Programme (UNEP), which administer Multilateral Environmental Agreements (MEAs), provide key platforms for science-based conservation and management, enabling

interdisciplinary MSR that brings together scientists, policymakers, engineers, and local communities to advance sustainable mitigation and adaptation (Nguyen & Vu, 2025).

The integrated ecosystem-based approaches to ocean governance acknowledge the interconnected nature of marine systems and the need to address issues within a broader ecological context (Nguyen & Vu, 2025). The Abidjan Convention, established in 1981 under the UNEP, provides a framework for regional cooperation and joint action to conserve marine ecosystems and promote their sustainable use (Cremers et al., 2021). However, significant gaps remain in marine habitats mapping, small-scale fisheries data, and comprehensive biodiversity inventories, underscoring the urgent need to advance scientific knowledge of the marine environment (Andreone, 2017). In Guinea-Bissau, the coastal region remains among the least-studied tropical ecosystems in West Africa due to limited research. The country is also among the most vulnerable African states to climate change. As described in Chapter 1, there is a need for enhanced environmental monitoring, given its low-lying terrain and complex coastal zones shaped by numerous rivers flowing into the Atlantic Ocean (Lemenkova, 2024).

Mangrove forests are a key coastal ecosystem in many tropical countries, including Guinea-Bissau, supporting coastal ecological processes and the livelihoods of coastal communities. The country's shoreline is laced with mangrove forests that extend across 326,000 hectares, 9% of the country's total land area (PLANTA, 2024). They play essential roles in nutrient cycling, shoreline stabilisation and protection, water filtration, climate regulation, and provide critical habitats and nursery grounds for fish and invertebrate species (Dias et al., 2022). These mangroves host some of the rice-farming systems along West Africa's coast, with farmers clearing areas of the swamp's inland margins to turn them into rice paddies (Sousa et al., 2025). These habitats, located on the floodplains of river deltas along the Atlantic Coast, are subject to tidal fluctuations driven by lunar cycles, which result in periodic flooding and inundation (Lemenkova, 2024). This highlights the ecological complexity and its importance for environmental stability and human livelihoods. Scientific understanding of these systems is a prerequisite for informed decision-making regarding resource use.

2.3 MSR and Sustainable Resource Management

Literature increasingly frames MSR through the lens of sustainability, linking scientific knowledge to governance mechanisms (Kowalski & Antunes, 2023; Nguyen & Vu, 2025). SDG

14, Life Below Water⁸, recognises the essential role of responsible resource management for sustainable development, as it is a vital factor in building a sustainable future (Moreira, 2023). It reinforces the need for MSR to support equitable and sustainable use of marine resources, ensuring that current practices do not harm marine ecosystems or compromise the needs of future generations (Coelho, 2024; Nguyen & Vu, 2025). Furthermore, SDG 14 strengthens ocean and fisheries governance by encouraging the sharing of scientific data and fish stock assessments, and by aligning national policies with UNCLOS, the United Nations Fish Stocks Agreement (UNFSA), and related instruments.

MSR generates the data and knowledge needed to manage fisheries sustainably. It supports the assessment of fish stocks, their migration patterns, and the influence of environmental factors on their abundance. Using technologies such as satellite monitoring, aquatic surveys, and genetic analysis, scientists can better understand the dynamics of marine ecosystems and develop evidence-based management strategies (Nguyen & Vu, 2025).

Marine resources within areas under national jurisdiction hold significant scientific and economic potential. It is essential to systematically assess and evaluate these resources so that timely, well-informed decisions can be made based on the best available data. Such decisions are vital to ensuring the conservation and sustainable use of these areas for the benefit of present and future generations (Kowalski & Antunes, 2023). Furthermore, community-based marine resource management, in which communities manage the coastal and marine resources on which they depend for daily life, is a standard management scheme that makes apparent the essential role that stakeholders' perceptions play in such efforts (Beyerl et al., 2016).

Effective resource management and conservation policies are best informed by scaled-down analyses that account for the complexities of local resource users, governance structures, and power relations. This localised perspective generates forms of knowledge that differ from those commonly used in global-scale management and conservation strategies (Aswani et al., 2018). Guinea-Bissau has formulated multiple Fisheries Management Plans since 1995, the most recent of which was adopted in 2025. These serve as instruments for regulating fishing effort and implementing conservation measures, including gear restrictions and bycatch limitations, with the overarching objectives of ensuring the sustainable exploitation of fisheries resources (Tedsen et al., 2014). Sustainable resource management cannot be achieved without

⁸ Sustainable Development Goal (SDG 14) 'Life Below Water' Targets. Access the official [link here](#).

safeguarding the biological diversity that underpins marine ecosystems. Thus, MSRs serve as a tool for connecting resource exploitation practices and biodiversity conservation objectives.

2.4 Biodiversity Conservation

The Convention on Biological Diversity (CBD), which entered into force in 1993, together with the Nagoya Protocol, addresses biodiversity irrespective of its terrestrial or aquatic origin. It pursues three principal objectives: the conservation of biological diversity; the sustainable use of its components; and, while affirming the sovereignty of states over their natural resources (Article 3), the promotion of access and benefit-sharing mechanisms relating to the exploitation or utilisation of genetic resources (Articles 1 and 15). This third objective was designed to facilitate a more equitable distribution of the costs and benefits associated with biodiversity conservation, particularly between developed and developing countries (Lallier et al., 2014).

Management and decision-making at the local or national level may exert a more immediate influence on certain marine ecosystem services and on the human activities that depend upon them than governance measures adopted at the global level (Tedsen et al., 2014). Environmental social sciences are crucial to understand human-marine interactions and for the management and conservation of marine resources by examining the past and present of these relationships (Aswani et al., 2018). This comprises an interdisciplinary and multidisciplinary body of scholarship that examines past and present human-environmental interactions and the cognitive, behavioural, economic, governance, political, and sociocultural systems that shape them.

The significance of enhancing connectivity in marine management and conservation is underscored by the CBD's Aichi Target 11, which calls for the establishment of effectively managed, well-connected Marine Protected Areas (MPAs) and other spatial conservation measures. Guinea-Bissau employs a range of management measures to safeguard its coastal and marine resources, which include establishing national parks, designating protected areas, and developing targeted plans for managing fisheries resources (Tedsen et al., 2014).

The Network for West African MPAs (*Réseau Régional d'Aires Marines Protégées en Afrique de l'Ouest*, RAMPAO) was established in 2007 to improve the coherence of MPAs and strengthen their representation in political and public policy arenas. However, cross-border connectivity was largely overlooked, as MPAs were implemented primarily at national or

regional scales (Assis et al., 2021). MPAs have been promoted as instruments for sustainable fisheries, with evidence suggesting their potential to restore depleted fish stocks and habitats and reduce the impacts of overexploitation on target species (CCLME Project, 2016). However, planning has largely overlooked the broader marine biodiversity, including habitat-forming ecological groups essential for feeding and nursery functions (Assis et al., 2021). Despite advances in conservation frameworks, their effectiveness is frequently undermined by IUU fishing, which poses a significant threat to biodiversity and sustainable resource management.

2.5 MSR and IUU fishing: a Challenge to Management Strategies

The importance of MSR for fisheries management is underscored in the UNFSA, the Convention on the Conservation of Migratory Species of Wild Animals (CMS), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the International Plan of Action on IUU fishing (IPOA-IUU). These treaties, conventions, and agreements encourage states to share information and undertake joint MSR efforts to combat IUU fishing. The cooperative approach promoted by SDG 14 further supports sustainable fishing quotas, effective conservation measures, and the suppression of the activities that threaten marine biodiversity (Nguyen & Vu, 2025). However, IUU fishing still poses a direct threat to the sustainability of coastal and marine ecosystems and to the human activities and communities that rely on oceanic resources (Paes & Okafor-Yarwood, 2024).

Efforts to combat IUU fishing involve a wide range of actors, including RFMOs, international organisations such as the FAO and the World Trade Organisation (WTO), and networks of states and NGOs. Despite these initiatives, IUU fishing persists due to the complexity of global fisheries governance and challenges in enforcing agreements (Paes & Okafor-Yarwood, 2024). In Guinea-Bissau, vessels operating within territorial waters without obtaining any licences and acting as IUU fishing vessels, as stated by Cross (2014).

IUU fishing contributes to the overexploitation of fish stocks, undermines fisheries data, management, and complicates marine governance. It is closely associated with stock depletion, including the capture of juvenile and vulnerable species, habitat damage from trawling, and the bycatch of non-target species. These impacts have serious socio-economic consequences for small-scale fishers, coastal communities, and States (Cheeseman, 2025). Therefore, to promote

the sustainable use of the marine environment, states employ measures such as Monitoring, Control, and Surveillance (MCS) to control human activities and support compliance and enforcement (Cremers et al., 2021).

The UNCLOS outlines how responsibility for addressing IUU fishing is shared between flag and coastal states. On the one hand, flag states are primarily responsible for regulating vessels under their jurisdiction and enforcing international obligations. On the other hand, coastal states exercise sovereign authority over fisheries activities within their EEZs, including MCS (Paes & Okafor-Yarwood, 2024). By recognising the urgent global challenge of sustainable fisheries management, SDG 14 aligns with SDGs 2 and 15, reinforcing objectives related to biodiversity, food security, and livelihoods. Acknowledging the transboundary nature of fisheries resources, states worldwide are increasingly emphasising the need for cooperation in MSR to inform integrated and effective management strategies (Nguyen & Vu, 2025).

Poor governance remains a significant constraint on effective MCS, with weak national institutions, limited inter-agency coordination, and insufficient harmonisation of legislation in parts of the Southeast Atlantic. These shortcomings hinder the implementation of MCS, port control, and inspection measures, thereby facilitating IUU fishing (Cremers et al., 2021). Moreover, reliable estimates of IUU fishing are scarce due to its clandestine nature and evasive practices. Moreover, evidence shows that IUU fishing severely harms coastal communities and small-scale fisheries, deepens multidimensional poverty, and reduces revenues in low and middle-income countries. In West Africa, weak governance and limited enforcement allow mainly distant-water industrial vessels to operate with relative impunity (Cheeseman, 2025).

Since 2010, the World Bank has implemented several projects in nine countries under the West Africa Regional Fisheries Programme (WARFP), which aims to improve the management of coastal fisheries by strengthening governance, combating IUU fishing through enhanced MCS systems, and increasing the net value derived from fish resources (Cremers et al., 2021). Nguyen & Vu (2025) suggested that developed states may also support developing states by providing advanced technologies for MCS, including VMS, satellite tools, and data analysis capabilities. These further complement traditional MCS systems (Cremers et al., 2021). The persistence of IUU fishing highlights the transboundary nature of marine challenges and the limitations of unilateral responses. Effective solutions require coordinated scientific efforts and shared governance approaches.

2.6 Regional and International Cooperation and Capacity Building in MSR

Marine governance necessitates collaboration among public and private institutions, as well as individuals, at various levels to achieve effective maritime management through official and informal agreements, which bring together diverse stakeholders (Moreira, 2023). International cooperation in MSR is crucial for a comprehensive understanding of fish stocks and ecosystems (Nguyen & Vu, 2025). In the current interconnected world, few fields operate without some level of international cooperation, as globalisation and the need to address complex scientific challenges beyond the capacity of any single state make collaboration essential for national progress (Teimurov & Kozheurov, 2020). MSR cooperation complements and expands existing research on EEZs and the high seas. Joint cross-boundary research efforts involve the sharing of data, expertise, and resources, improving stock assessment and enabling management plans that reflect the interests and needs of all participating States (Nguyen & Vu, 2025).

The activities occurring within a state's waters cannot be viewed in isolation, given the transboundary nature of challenges such as the exploitation of and depletion of migratory fish stocks, marine pollution, the spread of invasive species, and global climate change. Addressing these issues effectively, therefore, requires robust international cooperation and sustained global commitments (Tedsen et al., 2014). Scientific cooperation can catalyse the advancement of multilateral agreements that address ocean-related challenges through MSR. Although cooperation in MSR remains in its early stages with respect to the SDGs, it has nonetheless reached a threshold suggesting imminent rapid progress (Nguyen & Vu, 2025).

MSR cooperation under SDG 14 provide a foundation for treaties and conventions that ensure ocean policies are guided by the best available science, supporting the conservation and sustainable use of coastal and marine resources through ecosystem protection and science-based targets to mitigate ocean acidification, regulate fisheries, eliminate overfishing and IUU fishing, and conserve at least 10 percent of coastal and marine areas in accordance with national and international law (Nguyen & Vu, 2025). Furthermore, the cooperation promotes capacity-building to enhance States' scientific and technical abilities, particularly those of developing States, to engage effectively in monitoring and assessment activities.

The agreement places strong emphasis on capacity building and technology transfer, supporting developing states in strengthening their scientific capabilities to fully engage in MSR activities. This inclusive approach helps ensure that the benefits of scientific knowledge

are shared globally (Nguyen & Vu, 2025). Developing States, which often lack the resources and infrastructure required for extensive research, benefit from collaborative initiatives that facilitate knowledge exchange and capacity building. In this context, MSR facilitates data sharing, the allocation of expertise, and the exchange of resources among states, thereby improving access to critical resources and technologies (Nguyen & Vu, 2025). Although international cooperation has strengthened MSR and science-based management, significant constraints remain. Identifying these limitations is essential to improving the effectiveness of research and policy outcomes.

2.7 Knowledge Gaps and Limitations

Ocean science is a broad field that extends beyond oceanography and marine science to encompass multiple disciplines, with an emphasis on generating knowledge with practical applications. This utilitarian approach promotes transformative, co-produced science that positions society as both a creator and beneficiary of knowledge, while enabling forward-looking, geographically inclusive solutions and the transfer of expertise to regions with limited scientific capacity (Kowalski & Antunes, 2023). This lack of comprehensive scientific research has led to a limited understanding of the key factors shaping contemporary fishing practices, local communities' needs, and environmental knowledge and perceptions. As a result, broad assumptions prevail (Keleman et al., 2025). Restricted access to research findings contributes to public knowledge gaps, and the fragmentation of knowledge discourages investment in science, innovation, and technology (Kowalski & Antunes, 2023).

Sharing knowledge, expertise, and marine technology through MSR is essential for achieving SDG 14. UNCLOS provisions on MSR encourage states to promote international cooperation, capacity building, and technology transfer to support the conservation and sustainable use of marine resources, including fisheries (Nguyen & Vu, 2025). However, in Guinea-Bissau, limited data on coastal and marine resources constrain MSR, weak long-term biodiversity monitoring in MPAs and coastal ecosystems, scarce funding, lack of vessels, laboratories, and observation systems, poor digital and open-access data infrastructure, weak institutional coordination, and policy integration of MSR outputs, political instability affecting research continuity, and the absence of a national ocean policy, leaving key institutions such as the National Institute for Fisheries and Oceanography Research (INIPO) and the Institute of

Biodiversity and Protected Areas (IBAP) active but limited. These identified scientific and institutional gaps directly affect fisheries governance and international fisheries agreements.

2.8 Fisheries Agreement between the EU and the Republic of Guinea-Bissau

The EU is one of Guinea-Bissau's principal fisheries partners. The two parties concluded their first agreement in 1980, and twelve multi-year agreements have been established since then (Tedsen et al., 2014). These multi-year agreements provide for financial compensation to the Government of Guinea-Bissau in exchange for fishing rights, constituting the most significant portion of the payments received, as well as an additional contribution allocated for the development of the fisheries sector (Kaczynski & Fluharty, 2002; Tedsen et al., 2014). It should be recalled that, in April 2025, the European Parliament approved the implementation of the EU-SFPAs with Guinea-Bissau for the 2024-2029 period.

Public access fisheries agreements referred to as international fisheries agreements or, following the most recent reform of the Common Fisheries Policy (CFP) and SFPAs, constitute a central instrument of the EU's engagement in international fisheries governance and, more broadly, as an important indicator of its international legal personality, expressly recognised in Article 47 of the Treaty on European Union (TEU) (Andreone, 2017). However, criticism has been directed at the policy of allocating licences based on fishing effort or 'months' of fishing rather than TAC. Likewise, the resistance of many industrial operators to permit the presence of Guinea-Bissau's observers on board has been widely criticised (Cross, 2014). Thus, there is a need for a comprehensive, transparent approach for the SFPAs.

3. Methodology

This study focused on a systematic literature review that synthesised and examined the literature on the main challenges facing marine resources in Guinea-Bissau and the strategies identified to improve their sustainability. The study also assessed the impact of MSR on the management of Guinea-Bissau's coastal and marine resources through an empirical qualitative study by interviewing fishery experts. This multidimensional focus required integrating diverse methodologies to link ecosystem integrity and human well-being and to address economic, ecological, and social dimensions (O'Higgins et al., 2020).

3.1 Mixed Methods

Mixed methods research integrates quantitative and qualitative approaches within a single study. The design can be staged, deploying one set of techniques after another across phases of the research, or simultaneously within the same stage (Scharrer & Ramasubramanian, 2021). By pairing the context-rich insights of work with the descriptive statistics analysis, mixed-methods approaches deliver both a deep understanding and the ability to generalise findings to larger populations (Hennink et al., 2020). In practice, a mixed methods approach to systematic reviews follows the core procedures of any review: they begin by framing research questions, stipulating eligibility criteria, designing a search plan, gathering the identified studies, assessing their quality, and extracting the necessary data for synthesis (Stern et al., 2020).

Quantitative approaches, rooted in positivism, use scientific methods to collect measurable data and analyse relationships among variables in relation to existing theories and prior research (Fellows & Liu, 2021). This kind of research relies on statistical methods, numerical data, and large sample sizes to identify patterns and trends, contributing to evidence-based decision-making (Dehalwar & Sharma, 2024; Fellows & Liu, 2021). It employs a structured sequence of specific steps to generate new knowledge. This approach begins with data acquisition and, critically, proceeds to a rigorous analysis intended to elucidate, predict, and control the variables associated with the research problem (Seeram et al., 2022).

According to the methodological approaches, when research questions cannot be answered using quantitative methods, it is best to employ qualitative research (Busetto et al., 2020), which seeks to generate in-depth insights about a wide range of phenomena by immersing itself in the

setting and engaging directly with the specific context and social actors (Clark et al., 2021). Qualitative approach relies heavily on the study of experiences and the construction of meaning to analyse and interpret social phenomena (Scharrer & Ramasubramanian, 2021). It is an approach that aims to generate insights and enhance understanding of individuals' and groups' perceptions of the world (Fellows & Liu, 2021). This method employs an inductive approach, with flexibility, evolving ideas and designs rather than fixed a priori plans. It focuses on in-depth understanding, rich descriptions, and the interpretation of complex social phenomena (Scharrer & Ramasubramanian, 2021). Qualitative research starts with broad questions that are refined over time (Denny & Weckesser, 2022).

Qualitative research is an approach that facilitates a detailed examination of individuals' experiences through a specific set of methodological techniques. These may include in-depth interviews, focus group discussions, observations, content analysis, visual methods, and the study of life histories or biographies (Hennink et al., 2020). The interview is one of the most important methods in qualitative research, which may involve conversations with individuals, collaborations with community groups, or partnerships with organisations and institutions. Thus, this study also uses interviews to examine empirical evidence on the perspectives of marine resources experts in the country regarding coastal and marine resources.

3.2 Systematic Review

Systematic reviews are considered the gold standard for evidence synthesis and are essential tools in evidence-based medicine, social educational policy, and practice guidelines (Uttley et al., 2023). According to the Cochrane Handbook, a systematic review aims to gather evidence that meets pre-specified criteria to answer a clearly defined research question. It employs explicit, systematic methods designed to minimise bias, thereby providing more reliable findings (Donato & Donato, 2019). The study follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. This protocol supplies a framework that boosts the transparency, consistency, and reliability of reviews. Although PRISMA was initially created for research in medicine, its rigorous approach has since been adopted across various disciplines, helping to enhance the clarity and overall quality of evidence synthesis (Mandelberg et al., 2025).

This study was anchored in a protocol (see **Appendix A**) that synthesised a range of sources, including reports from Guinea-Bissau and articles indexed in Scopus, Web of Science, and Overton databases. By incorporating grey literature from agencies and international organisations, the study enhanced understanding of the evolution of MSR and the governance of coastal and marine resources. Grey literature, government and project reports that escaped database searches were compiled from national and international institutions such as the National Institute for Studies and Research (INEP), the Coastal Planning Office (GPC), the Ministry of Fisheries and Maritime Economy (MPEM), and the Institute of Biodiversity and Protected Areas (IBAP), as well as reports from the United Nations Development Programme (UNDP) and the Food and Agriculture Organisation of the United Nations (FAO).

Publications in Portuguese, English, and French were examined. English, widely accepted as the world's *lingua franca*, was selected because most research articles indexed in international databases, such as Scopus and the Web of Science, are published in English. Portuguese is the country's official language, and most reports are written in that language. French also appears on the list, reflecting the country's location along the border with French-speaking neighbours, namely the Republics of Senegal and Guinea. Moreover, French serves as a language, and a substantial body of relevant documents and reports is routinely written in French. The study also includes articles on Guinea-Bissau as part of West Africa.

3.3 Data Collection

The online searches across the Scopus, Web of Science, and Overton databases were conducted between April 10 and May 10, 2025, with a query run on June 14, 2025. Documentary searches at institutions across Guinea-Bissau were conducted from July 8 to September 27, 2024, followed by an additional search from December 8, 2024, through February 10, 2025.

3.3.1 Search Strategy

The search equations used to retrieve articles from the Scopus and Web of Science databases focused on various aspects of marine research, including resources, economy, sustainability,

biodiversity, fisheries, management, and ecosystem-related topics. The Boolean operators⁹ were applied to Title-Abs-Key, restricting the search to Title, Abstract, and Keywords, and to All fields, broadening the search across multiple searchable fields of each record and then to articulate different filters (**Table 3.1**).

Table 3.1 – Keywords and respective functions

Keywords	Focus
Guinea-Bissau/	Geographic Area
AND	
Marine OR sea OR ocean OR coastal	Environments
AND	
Resource OR biodiver* OR fish OR management OR sustainab* OR mangrove OR ecosystem OR inverteb*	Resources and ecosystems

First, the search focused on the geographic location ‘Guinea-Bissau’ to ensure that the retrieved articles mention Guinea-Bissau in the title, abstract, or keywords, thereby restricting the results to the country’s geographical context. The combination ‘marine OR sea OR ocean OR coastal’ filtered the articles to include only those that address marine, oceanic, or coastal environments. The combination ‘resource* OR biodiver* OR fish OR management OR sustainab* OR mangrove OR ecosystem OR bivalves’ broadened the search to include studies across various ecosystem and resource categories.

The search in Scopus using ‘TAK – Title, Abstract, and Keywords’ yielded 142 results. In Web of Science, the search using ‘All fields’ returned 190 results. The reason for choosing these strategies was that ‘TAK’ produces a more targeted and thematically coherent sample aligned with the research aims, and ‘All fields’ maximises breadth but requires more extensive screening to exclude irrelevant documents.

⁹ The use of Boolean operators (AND, OR) and truncation symbols (*) helped refine the search results, ensuring both comprehensiveness and relevance to the topic. In Scopus, the search was limited to titles, abstracts, and keywords, whereas in Web of Science it was applied across all fields.

3.3.2 Inclusion and Exclusion Criteria

The selection of studies was guided by clearly defined inclusion and exclusion criteria to ensure the relevance, coherence, and scientific quality. Scientific articles and grey literature addressing coastal and marine resource management, fisheries, biodiversity, sustainability, and ocean governance were included. They were explicitly related to Guinea-Bissau or situated within the regional context of West Africa and directly relevant to the country. Only publications from 2000 to 2025 were considered, a period corresponding to the post-conflict and the country's institutional reorganisation. Duplicate studies, publications mentioning Guinea-Bissau outside the context of the research, documents not aligned with the study's objectives, and works that, after full reading, did not present relevant analytical or empirical contributions to answer the research questions were excluded (see **Appendix B**).

After completing the search, 451 documents were identified from Scopus, Web of Science, and Overton databases, as well as from institutional sources in Guinea-Bissau. During the identification state, 322 records were retrieved from Scopus and Web of Science, including the duplicates ($n = 64$). After duplicate removal, the remaining records were screened. During the screening stage, titles, abstracts, and keywords were reviewed. A total of 243 records were excluded as unrelated to the review topic, leaving 89 records for further assessment. Of these, 58 were excluded during screening, and 31 full-text articles were assessed for eligibility. In the eligibility state, full texts were evaluated against the predefined inclusion and exclusion criteria. Fifteen articles were excluded, leaving 16 studies from Scopus and Web of Science.

Similarly, a total of 119 documents were identified from Overton ($n = 63$) and in institutions from Guinea-Bissau ($n = 56$). After reading the titles, abstracts, and keywords (when present), 86 documents were excluded. The remaining 23 reports underwent a full-text eligibility assessment; 13 were excluded, and 10 were ultimately included. **Figure 3.1** summarises this information in a flow diagram. Therefore, it is essential to distinguish between screening, the initial assessment of titles and abstracts to exclude studies that are clearly irrelevant to the review question, and eligibility, the subsequent evaluation of the full text to determine whether studies meet all predefined inclusion and exclusion criteria.

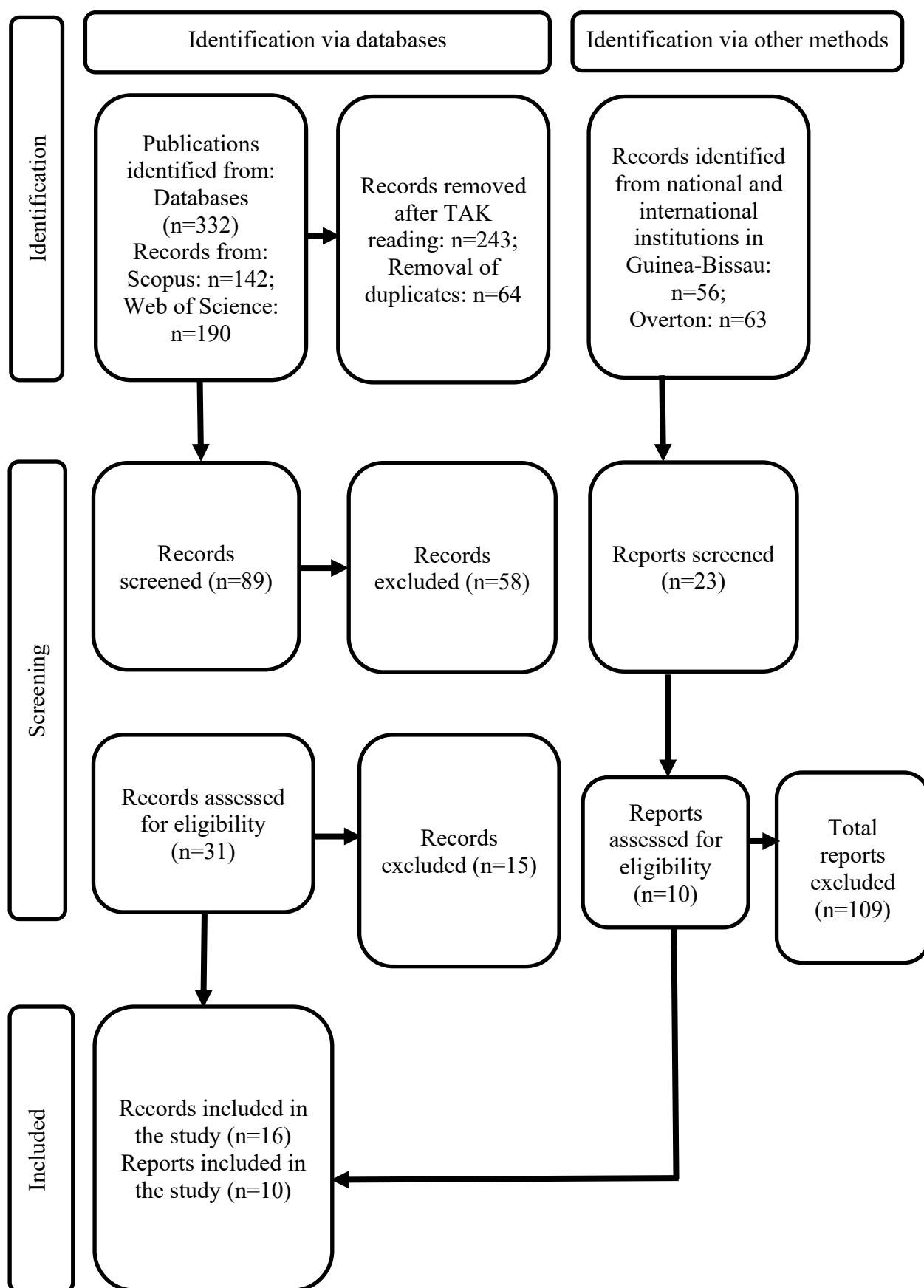


Figure 3.1 – Adapted 2020 PRISMA flow diagram with predefined eligibility criteria, transparent screening, and explicit reporting of inclusion and exclusion decisions. Source: <https://www.prisma-statement.org/prisma-2020-flow-diagram>.

3.3.3 Interview

To examine and discuss the problems identified by MSR that hinder Guinea-Bissau's coastal and marine resource management, four in-depth individual interviews were conducted with experts with extensive knowledge of MSR and coastal and marine management (**See Appendix C**). These interviewees bring a reservoir of knowledge encompassing MSR, fisheries monitoring, marine biodiversity management, conservation, IUU fishing, the nuances of fisheries licensing, and EU-Guinea-Bissau SFPAs. An in-depth interview is a data collection technique in which the interviewer and interviewee engage in a conversation centred on specific themes. It may be viewed as a conversation in which the researcher seeks insight into issues through a semi-structured interview guide (Hennink et al., 2020).

The interviewees were contacted through their institutions, via a request for authorisation to conduct the interview. Interviews, meanwhile, complemented the literature analysis, providing contextual and up-to-date information not available in published sources. These combinations strengthen the scope of the results, offering a more comprehensive understanding of the study context. One of these interviewees was a public employee; two were coastal and marine researchers; and one was a fisheries and biodiversity management advisor. It is worth noting that all interviews were conducted in person in Bissau, Guinea-Bissau, during fieldwork.

3.3.4 Ethical Considerations

The search was conducted in accordance with the principle of informed consent (**see Appendix D**), and the study ensured that participants received thorough information about the research, allowing them to participate voluntarily and with a clear understanding of the research's aims and procedures. This ethical foundation is rooted in the Belmont Report (1978), the National Commission's blueprint for protecting research subjects. The report continues to serve as a reference for review boards that oversee research involving participants (Hennink et al., 2020). Therefore, interviewees were assured that the interview was conducted only for research purposes. They were informed in advance that, once transcription was complete, the recordings would be permanently deleted and the files would be labelled as interviewees IN01, IN02, IN03, and IN04, respectively. This approach is fundamental to ensuring that any potentially adverse evidence about those individuals, which could later raise suspicion or compromise anyone's safety is eliminated, thereby preserving their anonymity.

3.3.5 Data Extraction

A total of 26 articles and reports were included: 16 (62%) from Scopus and Web of Science, 5 (19%) from Overton, and 5 (19%) from institutions (**Figure 3.2**). Similarly, of the selected articles and reports, 13 (50%) were published between 2021 and 2025, 7 (27%) between 2016 and 2020, 4 (15%) were published between 2000 and 2005, and 1 (4%) each between 2006 and 2010 and 2011-2015 (**Figure 3.3**). These articles and reports were organised in Excel, including the authors' names, year of publication, study titles, authors' institutions, study type, geographic focus, objective, methodology, keywords, language, and document source (**See Appendix E**).

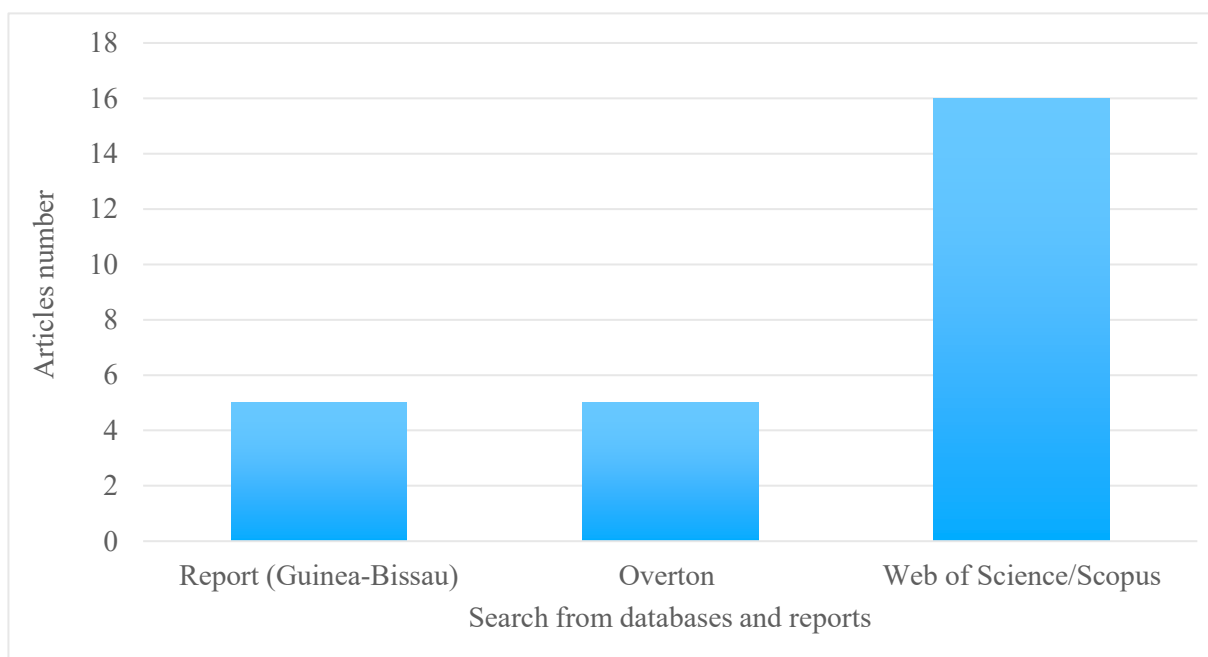


Figure 3.2 – The articles with corresponding databases and reports found in Guinea-Bissau.

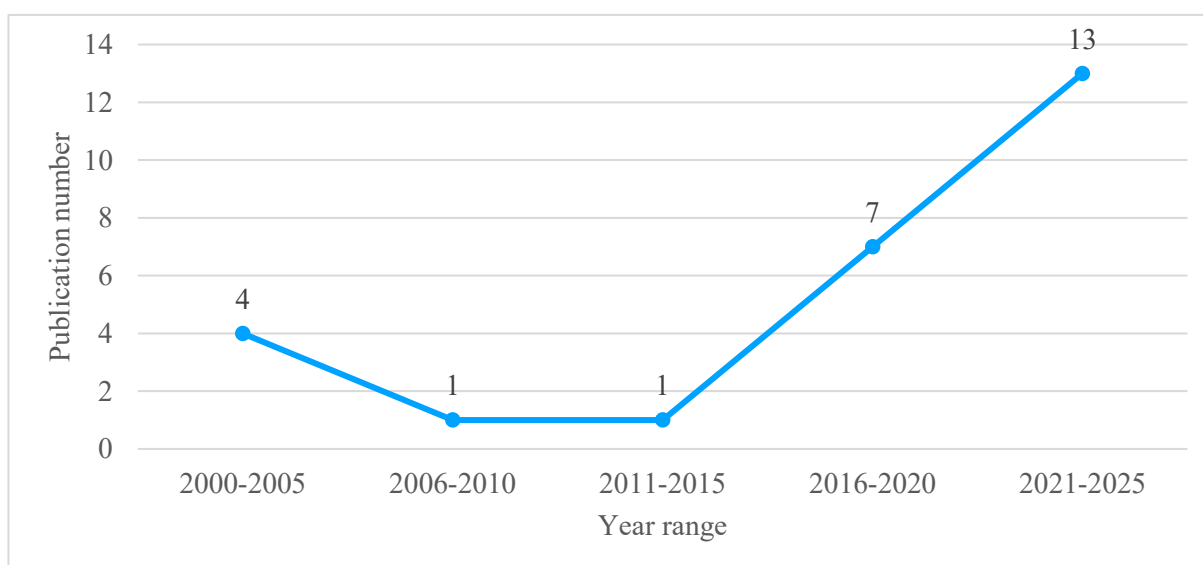


Figure 3.3 – Year range of articles and reports publication numbers.

3.3.6 Data Analysis

The study employed a qualitative research approach, utilising MAXQDA 24 to analyse both the literature and interview transcripts. The software was chosen precisely for its ability to enhance rigor, deepen analysis, and enable coding, categorisation, and synthesis of qualitative data from an extensive body of literature and interviews. By adhering to a comprehensive, transparently documented process for data collection, screening, and analysis, the methodology established a robust foundation for integrating diverse strands of evidence. This approach ensured the credibility and coherence of the research, provided a solid platform for interpreting, contextualising, and critically discussing the findings presented in the subsequent chapters.

4. Findings

This chapter shows and explains how MSR affects Guinea-Bissau's governance system through its various influences on coastal and marine resource management. Integrating literature, grey reports, and expert interviews. This chapter maps the feedback between science, decision-making, and livelihoods, highlighting both contributions and persistent gaps that condition sustainability management outcomes.

4.1 Artisanal Fishery

Several of the selected articles converge on the idea that artisanal fishing plays an essential role in food security and livelihoods in Guinea-Bissau, namely articles by Baran & Tous (2000), Campredon & Cuq (2001), Cross (2016), Intchama et al. (2018), and Keleman et al. (2024) that focused on artisanal fishery. Research indicates that multiple structural and management issues affect the sector, threatening its long-term sustainability. Campredon & Cuq (2001) emphasises the socioecological impact of artisanal fishing, while Baran & Tous (2000) highlight participatory models as emerging management opportunities.

Data shows significant variations in the small-scale fisheries production throughout the analysed period. The catch data collected by Intchama et al. (2018) on small-scale fisheries, including artisanal, subsistence, and recreational sectors, reveal the importance of artisanal fishing and its fluctuations from 2010 to 2017. In 2013, total small-scale fishing reached a peak of 44,700 tonnes per year, accounting for 56% of total catches. The sector reached its lowest point at 27,800 tonnes in 2017. Notably, these catches are largely unmonitored and remain unreported in official statistics, including those submitted to FAO (Intchama et al., 2018).

One of the identified challenges for artisanal fishing is competition for resources, as non-resident fishermen from many countries, including Guinea, Liberia, Senegal, and Sierra Leone, operate in the region (Cross, 2016). This is documented in the selected literature for the Bijagós and Rio Grande de Buba, which are important areas traditionally used by local fishermen (Campredon & Cuq, 2001; Cross, 2016). Non-resident fishermen who possess modern fishing equipment focus on catching valuable fish species, including barracuda (*Sphyraena spp.*), during the spawning season, while local fishers use cast and stationary nets. The study by Cross

(2016) suggests that sustainable practices and collaborative co-management approaches may help build and strengthen small-scale fisheries.

Efforts to address the artisanal fisheries challenges have included participatory governance initiatives, notably the Rio Grande de Buba project, which brought together community actors, authorities, and NGOs through consultation committees (Baran & Tous, 2000). These platforms facilitated information exchange, leading to the 1994 decree prohibiting gillnet fishing during barracuda spawning and to the development of Regional Consultation Councils, which enabled artisanal fishers to participate in resource management decisions. The Cacheu Mangrove Natural Park (PNTC) implements a regulatory system that includes fishing restrictions during certain seasons and limits the use of motorised pirogues to control overfishing. However, community involvement is limited, leading to low fisher compliance (Camala, 2021).

Another problem identified is that the numerous remote fishing locations present challenges for surveillance operations, as they remain inaccessible, allowing illegal fishing gear to be used (Intchama et al., 2018). This has also '*led artisanal fishers to go beyond the legal limits,*' as stated by Interviewee IN02 (2025), due to the country's weak monitoring capacity.

The study led by Keleman et al. (2024) on gender fluidity in Diola's Mangrove Fishing Strategies emphasised that women are now forced to redirect their fishing efforts towards resource intensification in rice paddy channels or nearby mangroves in response to declining aquatic resources. Furthermore, many fishermen argue that the decline of these resources cannot truly be attributed to local communities, as the root of the problem lies in the country's broader ocean fisheries, where distant-water fishing fleets not only deplete fish stocks but also compromise the food security and livelihoods of rural communities. As their primary source of protein and income, coastal populations face greater vulnerability to poverty and hunger, often pushing them to more destructive local fishing practices to survive (Keleman et al., 2024).

The literature and empirical research, such as Cross (2016), INO2 (2025), and Intchama et al. (2018) demonstrate that artisanal fishing in Guinea-Bissau is vital to the economy. Although it is essential for food security, resources are depleting, institutional support is weak, yet the sector remains vulnerable to destructive fishing practices. This dynamic is particularly relevant, especially in analysing how the literature situates industrial fishing within the country's coastal and marine resource management framework.

4.2 Industrial Fishery

The literature and empirical research on industrial fishing in Guinea-Bissau describe a sector deeply embedded in the global dynamics of demand for seafood (Kaczynski & Fluharty, 2002; Kaczynski & Looney, 2000), the technologies, and international competition due to increasing resource scarcity (Intchama et al., 2018; Kaczynski & Fluharty, 2002). Studies converge on identifying the dominant role of distant-water fleets and the State's limited capacity to control fishing effort within Guinea-Bissau's EEZ. However, there is divergence on the exact ecological impacts and the effectiveness of fishing agreements.

There is consensus that the sector operates under conditions of strong asymmetry between coastal countries and fishing powers (Kaczynski & Looney, 2000; Osemwegie et al., 2021). However, controversy remains regarding the extent to which technological modernisation can be reconciled with sustainability objectives and national benefits.

The industrial fisheries in Guinea-Bissau occur within a global context. According to interviewee IN03 (2025), *'the factors driving the increase in catches are the high demand for fish products. Globally, a large number of fish are consumed, and advances in technology and preparation methods have contributed to this change. The capacity to catch large quantities is constantly increasing as ships now use sonar to locate large schools of fish, track their movement, and capture them with precision.'* Although this modernisation increases global production, several authors warn that, without effective scientific management and monitoring mechanisms, these practices increase the risk of stock depletion. Between 1950 and 2010, industrial landings in the region increased from 819,000 to 7.4 million tonnes, with vessels from China, the EU, and Russia accounting for more than half of the catches (Osemwegie et al., 2021). In West Africa, resource exploitation has been dominated mainly by distant-water fleets operating under bilateral or multilateral agreements involving countries such as Cape Verde, Mauritania, Senegal, Guinea, and Guinea-Bissau (Kaczynski & Looney, 2000).

The most recent data reveal marked fluctuations in legal industrial production between 2011 and 2017, ranging from 252,352 tonnes in 2011 to a peak of 487,456 tonnes in 2015, followed by a decline to 280,620 tonnes in 2017. These fluctuations directly correlate with the number of licensed vessels, which reached 365 vessels in 2015, demonstrating the system's sensitivity to variations in fishing effort. The geographical composition also highlights the

centrality of distant-water industrial powers, with Russia accounting for 30% of landings, followed by China (20%) and the EU (15%) (Intchama et al., 2018).

The pattern of catches between 2010 and 2024 shows cycles of expansion and contraction consistent with the intrinsic dynamics of marine ecosystems and with the effects of policies, such as the issuance of licenses and the implementation of Fisheries Management Plans. **Figure 4.1** illustrates the variation in Data from 2010 to 2024.

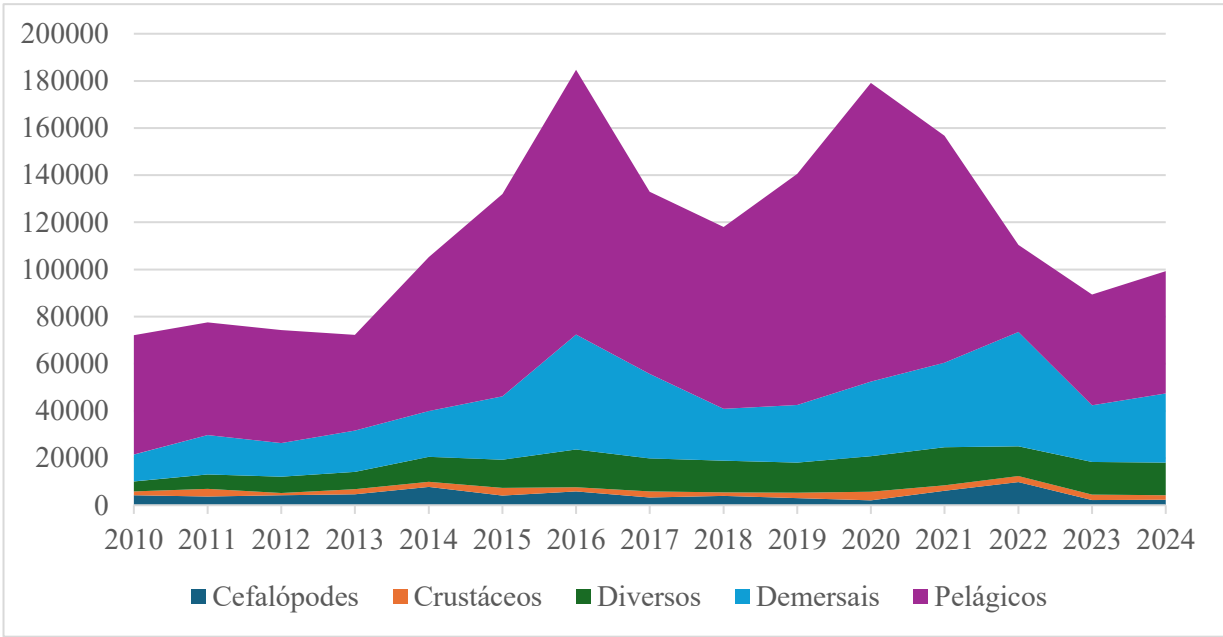


Figure 4.1 – Global catch data for various species from 2010 to 2024. Source: INIPO, 2025.

According to the above graph compiled from INIPO sources, global catches between 2010 and 2013 remained relatively stable, not falling below 80,000 tonnes for pelagic species, 40,000 tonnes for demersal species, and 20,000 tonnes for various cephalopods and crustaceans. Catches reached their highest levels between 2015 and 2016, suggesting a period of high resource availability or intensified fishing effort. However, from 2017 to 2018, a decline was observed, which may reflect the combined effects of resource depletion, regulatory adjustments, or environmental changes. Between 2019 and 2020, catches increased once again, possibly indicating a temporary recovery of specific stocks or a relaxation of management measures. This upward trend was short-lived, as a new decline was recorded through 2023, followed by another moderate increase from 2024 onward.

In Guinea-Bissau, studies tracking fishing effort indicate that industrial activities are concentrated along the boundaries of MPAs. Between 2012 and 2018, 386,000 hours of

industrial fishing were recorded in the EEZ (3.4 hours/km²), with vessels from 21 flags operating in 73.5% of the marine territory (Leurs et al., 2021). Spain, China, and Senegal stand out as leading operators, while trawlers account for more than 65% of activity near MPAs. Although there is no record of industrial fishing in the biodiversity hotspots of the Bijagós Archipelago, there is evidence of pressure on sensitive species, such as sharks and rays, whose catches varied drastically between 2016 and 2018, reflecting targeted fishing practices and raising concerns about long-term ecological impacts (Leurs et al., 2021).

The nation relies on distant-water-owned industrial vessels to access its coastal and marine resources, as it lacks any domestic industrial vessels. According to interviewee IN03 (2025), *‘national participation occurs mainly through joint ventures that rename foreign vessels under the Guinea-Bissau flag to guarantee access to fishing rights.’* Moreover, research identified a lack of landing ports, with 98% of facilities located in Bissau. This, combined with the absence of regional ports, limits the State’s ability to enforce landings and monitor catches (IN03, 2025). As a result, most industrial vessels land their catches in other countries, such as the port of Dakar (Senegal), Abidjan (Côte d’Ivoire), or Las Palmas (Spain) (EC, 2024). However, plans are to establish a deep-sea fishing port in Buba, aiming to address this gap by enabling on-site landings, catch-based licensing, and improved surveillance (IN03, 2025).

Another phenomenon is the legalised practice of transshipment at sea, which further exacerbates monitoring efforts. Recognised under the agreements, *‘the practice allows vessels to operate as floating factories, transferring catches offshore without returning to port’* (IN03, 2025). Additionally, fishing licenses are issued based on Gross Tonnage (GT)¹⁰ rather than TAC, which means there are no catch ceilings per vessel. Although both the 2019 and 2024 SFPAs Protocols between the EU and Guinea-Bissau introduced gradual reforms toward a TAC-based licensing system, the implementation remains contingent on the development of national port infrastructure and monitoring capacity (NI03, 2025).

Considering the above, the literature indicates that industrial fishing in Guinea-Bissau is characterised by high levels of exploitation by distant-water fleets, weak state control capacity, and an institutional system shaped by historical dependencies and asymmetric international agreements. This vulnerability not only intensifies the pressure on the fishery resources but also amplifies phenomena that cut across different fishing modalities, including bycatch, which is

¹⁰ Gross Tonnage (GT) is a volumetric measurement of a ship’s total capacity.

frequently associated with industrial fishing vessels, also occurs in artisanal fishing, albeit with varying intensities and implications.

4.3 Bycatch

Both interviews and the literature on bycatch in Guinea-Bissau highlight a persistent structural problem stemming from the low selectivity of fishing gear, weak enforcement, and the region's high marine biodiversity. Studies indicate that bycatch constitutes one of the main pressures on vulnerable species. However, there is divergence on the actual magnitude of bycatches due to the historical absence of robust monitoring systems.

Both large industrial vessels and small artisanal canoes retain non-target species, either because fishing gear is not highly selective or because competition for increasingly scarce resources is increasing. Thus, the problem of bycatch emerges as a point of convergence between the two sectors, revealing ecological and socioeconomic impacts that transcend the boundary between artisanal and industrial fishing. This helps to assess how these simultaneous dynamics shape resource sustainability.

Some authors, such as Kaczynski & Looney (2000) emphasise the central role of fishing agreements and industrial practices in intensifying bycatch, while more recent studies also point to the contribution of artisanal fishing to the capture of some unintentional species (Leeney et al., 2015; Schilling et al., 2023). Thus, the literature describes a multifaceted phenomenon in which regulatory gaps, economic incentives, and ecological dynamics intertwine, shaping the country's marine sustainability.

The unintentional capture of non-target species makes bycatch one of the most significant and longest-uncontrolled problems in Guinea-Bissau's fishing industry. Data from the 1990s indicate that licensed industrial fleets often operated in ways inconsistent with their stated targets. In 1996, a large proportion of the 41 EU vessels holding shrimp fishing licenses predominantly caught cephalopods and demersal species, deviating substantially from their target species. Cases such as that of an Italian vessel, whose landings contained only 8% shrimp and 92% other species, illustrate this recurring pattern, replicated by Portuguese fleets that caught 71% finfish and only 27% shrimp. Only the Spanish fleet presented values more aligned with the license, with 55% of shrimp (Kaczynski & Fluharty, 2002). These deviations were

reinforced by the absence of systematic bycatch data collection until 1997, which prevented scientific assessments of abundance and the determination of the economic value of non-target species caught in the country's EEZ.

The regulatory framework proved incapable of limiting the extraction of undirected biomass because shrimp trawlers used 25 mm nets, smaller than the minimum 65 mm required for finfish, thereby retaining organisms across all size classes. Coupled with reduced licensing fees of approximately US\$266 per GT, this situation encouraged the maximisation of fishing effort. In 1997, it is estimated that 27% of reported catches in shrimp and cephalopod fisheries corresponded to bycatch from demersal fishing, raising the shrimp estimate to 5,317 tonnes, values not reflected in the fees paid, calculated only based on the type of license, generating direct economic losses for the Guinea-Bissau State (Kaczynski & Fluharty, 2002).

The high biodiversity of tropical fisheries naturally increases bycatch, as fishing areas exhibit overlapping niches and high species density. Empirical data from CIPA (2019) indicate that a large portion of shrimp trawler catches consists of finfish. Moreover, vulnerable species such as sharks, rays, sea turtles, and cetaceans remain at significant risk (Leeney et al., 2015).

As an interviewee described, in the case of sea turtles and cetaceans, bycatch is either released alive or consumed. If a caught cetacean, such as a dolphin, is still alive during hauling, it may be released. Otherwise, these were recorded as incidental mortality (IN03, 2025). Additionally, the practice of catching sea turtles through bycatch remains a problem. The study of Schilling et al. (2023) noticed that an artisanal fisherman said their pirogues can catch multiple turtles each day, depending on the fishing spot and season. Similarly, industrial trawlers operating with low-selectivity gear result in unreported drowning and deaths of sea turtles when they get stuck in nets during the fishing activities (Sobrino et al., 2023). Yet, as mentioned by two interviewees, the system continues to have ongoing weaknesses, including illegal operators such as unlicensed distant-water artisanal and industrial fleets that target protected species, such as sharks and guitarfish, for the fin trade, thereby further intensifying pressure on these vulnerable species (IN01, 2025; IN02, 2025).

Recently, initiatives, such as the 'Optimisation of the selectivity of trawling gear and reduction of incidental catches in the EEZ of Guinea-Bissau Project' under the 2019-2024 EU-Guinea-Bissau SFPAs Protocol, have sought to address bycatch through experimental gear selectivity trials carried out by the Spanish fleet coordinated by the Spanish Institute of

Oceanography (IEO) in collaboration with INIPO, aiming to generate data to inform future regulatory amendments (Sobrinho et al., 2023). However, the results remain to be examined.

In sum, as described in the literature, bycatch in Guinea-Bissau waters results from fishing gear selection, weak regulations, and economic incentives that promote large catches, as well as inadequate monitoring systems, which endanger marine biodiversity and the future sustainability of coastal and marine fisheries, representing one of the main challenges to the sustainability of marine living resources in Guinea-Bissau.

4.4 Shellfish Collection

The selected articles and empirical research on shellfish collection in Guinea-Bissau underscore the centrality of this activity in subsistence strategies, coastal economies, and local sociocultural structures, especially highlighting the role of women in estuarine systems. Studies consensually point to the predominance of women in shellfish value chains (Chuku et al., 2022). And to the historical integration of this practice into customary management systems, particularly among communities such as the Felupe and the Bijagó. However, divergences emerge regarding the current impact of intensified harvesting, especially in contexts where recent commercialisation and integration into external markets seem to alter traditional patterns and compromise informal regulatory mechanisms (Cormier-Salem, 2017; IN04, 2525). The bibliography and empirical research reveal a field characterised by cultural continuities, intensifying economic pressures, and institutional constraints within the formal framework.

In several coastal regions, bivalve harvesting of *Crossostrea tulipa* and *Crossostrea gasar* has increased, reflecting gender dynamics, food needs, and market opportunities (IN04, 2025). This interviewee IN04 (2025) mentioned that some areas, such as ‘*Orango Island, still show extraction rates below regeneration capacity. Continuous year-round harvesting in places like Ilondé, Insalma, Prabís, São Domingos, São Vicente, and Suzana indicates intensification and potential pressure on ecosystems.*’ Across the 11 West African countries assessed by Chuku et al. (2022), an estimated 55,558 shellfishers were identified, the majority of whom are women. However, some countries, including Guinea-Bissau, recorded fewer than 1,000 shellfishers. In the Bijagós archipelago, women’s roles extend beyond shellfish harvesting to include seasonal activities such as palm oil production, cashew processing, mangrove honey collection, and the

trade in smoked fish (Cormier-Salem et al., 2010), reinforcing the centrality of women in mangrove economic and social activities.

Historically, shellfish harvesting was regulated by customary institutions that established ecological protection norms based on local cosmology. The interviewee IN04 (2025) explains that ‘*Among the Felupe and Bijagó, practices such as the prohibition of cutting mangrove roots and the spatial rotation of harvesting areas functioned as conservation systems, albeit not formalised.*’ These rules were intertwined with rituals and cultural meanings.

Species such as *Anadara senilis* (*Combé* in Creole)¹¹ and *Tagelus adansonii* (*Lingron* in Creole) had ceremonial value. These molluscs are essential for the validity of certain ritual practices in the Bijagós Islands. The researcher explains that increasing market integration has transformed collecting practices. As external actors began extracting and marketing shellfish, many local women transitioned from a subsistence system to active participation in the market. In Bijagós Archipelago villages, such as Eguba, Urcan, and Uno Islands, *Combé* is now harvested for sale, contributing to a reduction in average specimen size due to shorter reproductive recovery periods, indicating increasing pressure on resources (IN04, 2025).

Two key drivers identified in regional shellfish governance analyses are now reshaping extraction patterns. While traditional harvesting methods, such as detripping (manual removal without damaging mangrove roots), are considered sustainable practices, alternative techniques involving root cutting or dislodgment threaten the integrity of mangrove ecosystems (Cormier-Salem, 2017). Women’s extractive practices are further shaped by environmental dynamics, tidal cycles, domestic labour responsibilities, and limited access to equipment, making shellfish collection both physically and temporally demanding.

In response to emerging pressures, several co-management programs have been tested in Guinea-Bissau, aligning with regional trends observed in Gambia and Ghana, where successful models are based on community organisation, clear identification of socio-ecological challenges, institutional strengthening, multi-sectoral participation, and adequate funding (Chuku et al., 2022). Initiatives such as *Cocina da Terra* (2008), promoted by Tiniguena, sought precisely to link environmental protection, food security, and cultural practices to reinforce the value of local products and preserve traditional resource management (Cormier-Salem et al., 2010). In line with these principles, the country has also begun implementing co-management

¹¹ Creole is the *lingua franca* in Guinea-Bissau.

initiatives, such as the oyster tenure plots introduced in Cacheu, São Vicente, and Cantanhez to prevent conflicts and encourage localised stewardship through defined resource tenure. Interviewee IN04 (2025) summarised: *‘If I create this oyster field, I will manage it.’*

In 2021, the PNTC launched a pilot oyster-farming system to alleviate pressure on wild stocks by shifting women’s labour from extractive collection to semi-cultivated production. However, technical and organisational challenges prevented full implementation and marketing (Keleman et al., 2024). This demonstrates attempts to transition from open-access extraction to managed aquaculture systems integrated into the MPA management framework.

Therefore, the literature shows that shellfish harvesting in Guinea-Bissau results from interaction between traditional practices, gender dynamics, and emerging market systems. However, these systems face significant challenges amid contemporary pressures of commodification, changes in livelihoods, increased external demand, and ongoing transitions among cultural continuity, economic transformation, and ecological vulnerability.

4.5 IUU Fishing, MCS, and Legal Framework

The literature on IUU fishing in Guinea-Bissau converges on identifying this phenomenon as one of the greatest threats to marine sustainability and coastal governance across West Africa. Studies describe a structurally vulnerable system in which extensive EEZ, limited state capacity, and strong power asymmetries in the fishing sector favour illicit practices by both domestic and distant-water fleets (Doubouya et al., 2017; Intchama et al., 2018; Osemwegie et al., 2021). Although there is consensus on socioeconomic and ecological losses associated with IUU fishing practices, the literature emphasises the responsibility of various actors, from distant-water fleets to local operators, and the effectiveness of MCS systems.

Additionally, criticisms have emerged regarding the legal and political contradictions in international fisheries agreements, which often coexist with structural gaps in national enforcement, thereby reinforcing a pattern of dependency and institutional fragility. Thus, the literature shows that IUU fishing in Guinea-Bissau is not merely a set of infractions but also reflects its geopolitical dynamics, logistical limitations, and tensions between economic development and conservation (Doubouya et al., 2017; Paes & Okafor-Yarwood, 2024).

4.5.1 Illegal, Unreported, and Unregulated (IUU) Fishing

IUU fishing remains a persistent and deeply entrenched threat within Guinea-Bissau's fishing sector, mirroring patterns observed throughout the West African subregion. Despite formal licensing, monitoring, and regulatory systems, enforcement capacity remains extremely limited, allowing industrial vessels and small fleets to operate with varying levels of non-compliance.

A comprehensive study of Doumbouya et al. (2017) documented 230 infractions across 23 violation categories¹² throughout the region and revealed that one-third of these offenses received insufficient enforcement. Under-reporting fishing effort relative to GT was the most common infraction, accounting for only 19% of sanctioned cases, reflecting weak surveillance and administrative gaps that enable regulatory evasion. These weak governance structures are deepening countries such as Guinea-Bissau's vulnerability to IUU fishing, as well as in many West African coastal States (Osemwegie et al., 2021).

Available data indicate that Guinea-Bissau is one of the countries most affected by IUU fishing in the region. Between 2011 and 2017, the industrial fleet is estimated to have reported only 41% of the catches made in its EEZ. In 2017, total catches may have reached 370,000 tonnes, but only 2% of them were reported to the FAO (Intchama et al., 2018). While approximately 60% of industrial catches are not reported to national authorities, small-scale fisheries remain largely invisible in international statistics. This structural failure implies estimated annual economic losses of US\$429.2 million, of which more than US\$239.8 million (56%) result directly from IUU activities conducted by distant-water fleets operating under weak governance oversight (Intchama et al., 2018; Okafor-Yarwood & Belhabib, 2020).

Economically, IUU fishing in West Africa results in annual losses exceeding US\$2.3 billion, whereas MCS actions generate only about US\$13.8 million in direct revenue. In the case of Guinea-Bissau, data from 2013 to 2017 show that patrols and maritime enforcement operations reduce the incidence of illegal industrial fishing, which increases the number of inspections, correlates with greater apprehensions, and results in fewer infractions (Intchama et al., 2018). However, these advances remain fragile due to insufficient funding, limited patrolling capacity, and weak judicial follow-up, collectively undermining their deterrent effect.

¹² Offences include under-reporting of fishing effort, use of illegal gear, fishing in a prohibited area, operating without a license, forgery or marking default, unauthorised entry or exit from EEZ, and others.

The literature shows that IUU fishing in Guinea-Bissau is both a consequence and a catalyst of structural governance failures, resulting in profound ecological, economic, and social losses. In this context, effective MCS systems become not only technical instruments but also central elements for addressing these institutional weaknesses. The insufficiency or absence of robust monitoring, control, and enforcement mechanisms allows illegal practices to thrive, reinforcing cycles of impunity and unsustainable exploitation of coastal and marine resources. Thus, MSR can contribute directly by providing data on fishing effort, stock status, and illegal activities, strengthening the MCS system and supporting targeted evidence-based co-management.

4.5.2 Monitoring, Control, and Surveillance (MCS)

The literature on MCS of fisheries activities in Guinea-Bissau reveals a situation marked by structural weaknesses, limited operational capacity, and dependence on external support, which allows the persistence and expansion of IUU fishing in the country. Regional studies indicate that this situation is not isolated but shared by several coastal States in West Africa, where financial deficits, lack of equipment, and corruption hinder the practical application of fisheries legislation (Doubouya et al., 2017; FAO, 2020a). Although there is consensus on the fundamental role of MCS systems in ensuring resource sustainability, the literature offers divergent views on the impact of recent reforms and the extent of the country's external dependence. In the case of Guinea-Bissau, the punctual improvements in control have not corresponded to structural transformations in the State's capacity to monitor its extensive EEZ.

The evolution of efforts against illegal fishing practices between 2010 and 2017 illustrates that Illegal catches by industrial fleets increased from 26,708 tonnes in 2010 to almost 62,100 tonnes in 2015, remaining relatively stable thereafter, indicating the limited deterrent capacity of existing enforcement systems. In 2017, illegal industrial fishing represented 22% of unauthorised activities in the EEZ (Intchama et al., 2018). However, data also indicated that increased patrols have been trending upward. The surveillance days at sea increased from 33 in 2013 to 72 in 2017. During this period, the number of inspections grew almost three times higher, while vessel arrests rose seven times more than before (**Figure 4.2**). These results suggest that presence at sea has a direct impact on fleet behaviour, but it is insufficient to compensate for the lack of permanent MCS capacity.

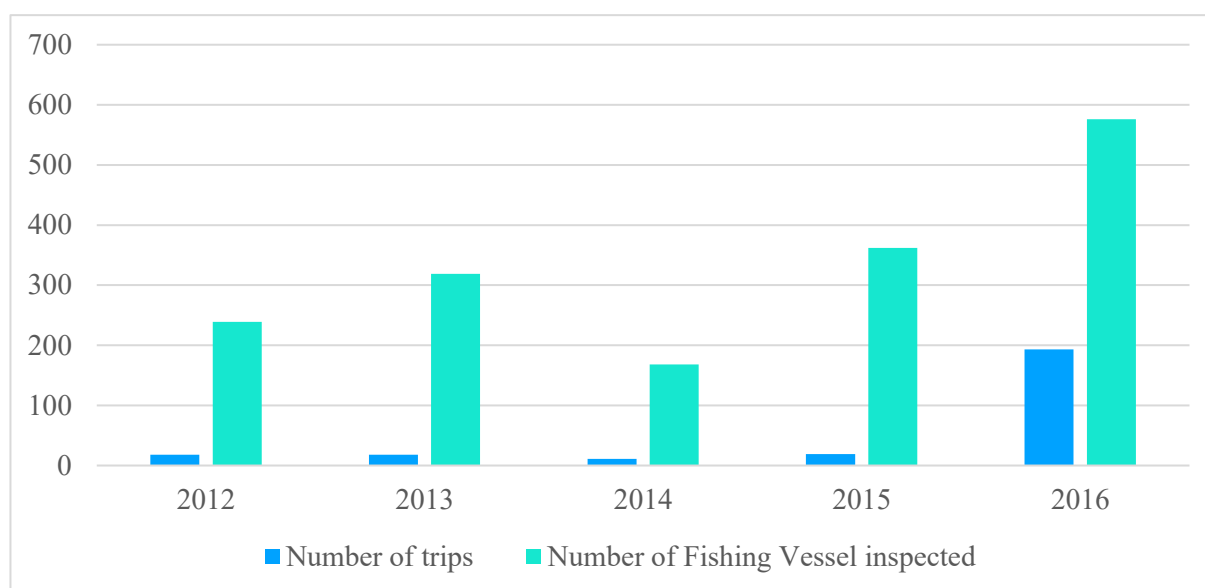


Figure 4.2 – Guinea-Bissau MCS and vessel inspection from 2012 to 2016. Source: Sub-Regional Fisheries Commission (SRFC) in FAO (2020a).

Monitoring artisanal fisheries presents distinct dynamics. Between 2013 and 2017, 820 of the 840 observed pirogues were inspected, resulting in 230 arrests, about one per day, and infractions detected in three out of ten vessels. Paradoxically, only 4% of licensed pirogues were sanctioned, suggesting greater compliance in the artisanal sector and more accessible enforcement due to geographical proximity (Intchama et al., 2018). The contrast between the relative effectiveness in the artisanal sector and the difficulty of controlling industrial fleets highlights the structural limitations of open-sea monitoring.

The institutional complexity constitutes another key limitation. The National Institute for the Supervision of Fishing Activities (INFISCAP) leads inspection operations, with support from INIPO and the General Directorate of Artisanal Fisheries (DGPA). It has neither financial autonomy nor direct control over operational logistics, and all of them depend heavily on external funds (Nakamura & Amador, 2022). According to interviewee IN02 (2025), *‘even where infrastructure has been installed, such as the advanced posts in Bubaque, Cacheu, Cacine, and Caravela, the absence of INFISCAP agents and the occupation of the facilities by the Coast Guard severely constrain MCS activities.’*

The constraints are severe due to the almost total absence of operational equipment. The main limitations of the MCS are driven by the scarcity of operational resources. Currently, according to interviewee IN02 (2025), *‘the available patrol boats are the Okinka Pampa, the Ocante Bunhum, under repair, and the Ndjamba Mané, under maintenance in Spain, in addition*

to a new vessel that is not yet operational. The two fast patrol boats, ‘Baleias,’ although more agile, are also experiencing technical problems.’ In contrast, neighbouring countries such as Cape Verde, Mauritania, Senegal, and Gambia operate aircraft, patrol boats, and coastal units that allow for rapid responses and continuous operations at sea (FAO, 2020a). **Figure 4.3** illustrates some patrol boats for fisheries MCS activities in national waters.



Figure 4.3 – MCS means. Sources: <https://angnoticias.blogspot.com/2017/04/fiscalizacao-maritima.html>. <https://www.odemocratagb.com/?p=35062>.

The introduction of technological tools, such as Automatic Identification Systems (AIS) and VMS, has improved the visibility of maritime activities, but has not automatically translated into greater interception capacity. Detecting infractions does not guarantee the ability to act. Persistent problems, such as fuel shortages, operational vessels, and inadequate institutional coordination, often prevent patrol units from being mobilised. For instance, the comparative analyses of techno-optimism versus techno-reality in Ghana and Guinea-Bissau demonstrate that the deterrent effect of these technologies remains limited when they are not accompanied by regular patrolling and effective judicial processes (Paes & Okafor-Yarwood, 2024).

The reliance on external capabilities becomes evident in the use of patrol vessels loaned by neighbouring countries, notably Senegal, as well as in participation in regional initiatives such as the Regional Fisheries Governance in Western Africa (PESCAO), the West Africa Regional Fisheries Programme (WARFP), and the West Africa Task Force (WARF). The interviewee IN02 (2025) stated that *‘these programs have strengthened enforcement operations and promoted cross-border cooperation, allowing, for example, the continued pursuit of vessels crossing maritime borders.’* However, despite these advances, the literature indicates that progress remains fragile due to insufficient penalties, the absence of port controls, the lack of a

TAC-based licensing system, and, above all, the absence of a firm political commitment to enforcement (Paes & Okafor-Yarwood, 2024).

The 2015-2020 Strategic Plan set ambitious goals for modernising fisheries management, including strengthening systems and enhancing environmental protection. However, financial, logistical, and political limitations continue to prevent these reforms from translating into stable operational capacity (Nakamura & Amador, 2022). The interviewee IN02 (2025) stated that, *‘if we had the means and the political will, those who want to help, those with good intentions, we could significantly reduce illegal fishing. We fight, we fight a lot, but nothing changes,’* revealing his frustration with the sector’s structural difficulties.

The literature and empirical research indicate that coastal and marine management systems in Guinea-Bissau have shown incremental improvements but remain constrained by chronic resource limitations, external dependence, and a lack of institutional coherence. These limitations reveal profound weaknesses in the legal and institutional framework for fisheries management, which should support sustainable resource management, thereby ensuring more coherent, self-sufficient, and resilient fisheries governance.

4.5.3 Legal and Institutional Framework for Fisheries Management

The literature on the legal and institutional framework of fisheries in Guinea-Bissau highlights a relatively robust regulatory system in formal terms, but one characterised by profound weaknesses in implementation, coordination, and enforcement. Studies converge on the understanding that the vulnerability of marine resources cannot be understood in isolation and must be analysed in the context of the political economy of access by distant-water fleets, weak state capacity, and the power asymmetries that characterise international fisheries negotiations (Kaczynski & Fluharty, 2002; Kaczynski & Looney, 2000).

Although the national legal framework incorporates modern principles of sustainability, precaution, and socioeconomic protection of coastal communities, the literature reveals a persistent gap between norm and practice. This discrepancy reflects both material limitations and unstable institutional structures, which hinder the systematic application of regulations and allow the maintenance of almost structural patterns of non-compliance.

Fisheries management in Guinea-Bissau is anchored on Decree-Law No. 10/2011, later amended by Decree-Law No. 18/2016, which establishes the General Fisheries Law. This legal framework integrates four central principles: precaution, sustainability, prevention, and socio-economic protection, as well as defines specific obligations for resource governance. Article 3 establishes that resource management should promote shared responsibility and international cooperation in the sustainable use of transboundary fisheries stocks, reflecting alignment with international instruments. Article 12 requires a comprehensive registry of all vessels authorised to operate in the EEZ, and Article 13 requires institutional harmonisation between national, regional, and international bodies for entry, inspection, and control procedures (Nakamura & Amador, 2022). Formally, the country has legislation aligned with international best practices.

Decree-Law No. 4/2014 defines the institutional architecture, which establishes the Organic Law of the Ministry of Fisheries and Fish Resources. The Ministry is responsible for policy formulation and coordination of scientific research, while promoting the sustainable growth of the fisheries sector. The National Fisheries Council, regulated by Article 6, functions as a consultative body, allowing some multi-stakeholder participation in decision-making (Nakamura & Amador, 2022). Despite this formal design, the system operates in a context of high institutional instability, administrative dispersion, and weak coordination among entities, which limits the effectiveness of measures and reduces the scope of reforms.

The discrepancy between the legal framework and its application is widely documented. According to Doumbouya et al. (2017), most recorded infractions in West African waters are committed by vessels with valid formal documentation, including fishing licenses. However, underreporting of catches, incursions into areas reserved for artisanal fishing, and the capture of protected species remain standard practices and are rarely sanctioned. This reality reinforces a pattern in which regulatory measures disproportionately affect small coastal communities that depend on coastal resources, while large industrial operators, including distant-water fleets, often escape accountability. Thus, the legislation exists, but lacks the necessary material, political, and institutional instruments to ensure its enforcement.

The literature also highlights that the fragility in implementing the legal framework is strongly linked to external factors. Asymmetries in the negotiation of fishing agreements, dependence on revenue from access licenses, and geopolitical pressures shaping relations between coastal states and fishing powers reinforce an environment in which compliance with the law becomes secondary to immediate economic needs (Osemwegie et al., 2021). Thus,

although Guinea-Bissau incorporates progressive sustainability principles and responsible governance, the impact of these norms is diminished by persistent limitations in enforcement mechanisms and a weak political and strategic commitment to their implementation.

The legal and institutional framework for fisheries in Guinea-Bissau reveals a profound disconnect between normative principles aligned with international standards and the insufficient capacity to implement them. This disconnection is evident in scientific assessment, where a lack of technical, human, and financial resources limits the production of reliable data on resource status, ultimately hindering sustainable decision-making that responds to pressures on aquatic resources and environments.

4.6 Scientific Fisheries Resources Assessment and Status

The literature on the scientific assessment of fisheries resources in Guinea-Bissau reveals a knowledge production system marked by fragmentation, structural gaps, and a strong dependence on external initiatives. There is consensus that national scientific capacity is limited, reflecting both the absence of continuous funding and the lack of robust institutional infrastructures. These factors reduce the regularity, depth, and scope of stock assessments. Although studies highlight specific advances, such as the initial development of fisheries research by INIPO and the growing role of international collaborations, divergences persist regarding the reliability of available data and the country's capacity to sustain autonomous scientific assessment processes (Sobrino et al., 2022, 2023, 2024).

According to the articles selected for this study, one of the first systematic efforts in fisheries research was conducted by CIPA (now INIPO) in the early 1990s, with objectives focused on validating previous studies, training national technicians, and expanding the study areas to the Cacine River and the Bijagós Archipelago (Baran & Tous, 2000). These studies helped establish a planning-based system for fisheries resource management by identifying potential fishing areas and setting rules to ensure the sustainable protection of resources.

The assessment of resources in rivers and in the EEZ has been irregular. Biomass surveys have provided useful but insufficient data to support robust management models (Kaczynski & Looney, 2000). In the case of artisanal fishing, the data collection system developed in the Rio Grande de Buba established a solid basis for monitoring estuarine and coastal fisheries (Baran

& Tous, 2000). This demonstrates the potential of localised projects with funding and methodological continuity. However, as in the case of industrial sectors, Kaczynski & Fluharty (2002) showed that in the absence of systematic reporting by EU fleets operating in Guinea-Bissau's EEZ, onboard observer programs and INIPO databases constitute the main, and sometimes only, sources of information on industrial activities.

The INIPO currently maintains a 25-year time series (2000–2025) on industrial catches, categorised by license type (shrimp, cephalopods, demersal, and pelagic). Onboard observers collect essential data, such as catch volumes, number of hauls, fishing positions, and duration of operations, allowing for detailed analyses of fishing effort (INIPO, 2025; Sobrino et al., 2022, 2023, 2024). However, when analysing the database's coverage, it was observed that catch data are missing for certain vessels relative to the licenses issued. This absence is particularly pronounced in 2019, when coverage was 64%. For the years 2017, 2019, and 2020, coverage levels were 113%, 98%, and 80%, respectively (Sobrino et al., 2022).

At the regional and international levels, Guinea-Bissau's participation in organisations such as the International Commission for the Conservation of Atlantic Tuna (ICCAT) and the Fishery Committee for the Eastern Central Atlantic (COPACE) has strengthened the country's integration into stock assessment processes, allowing access to advanced methodologies and complementary databases. Moreover, 21% of the sectoral support funds from the 2019-2024 EU-Guinea-Bissau SFPA were allocated to strengthen INIPO's research capacities, particularly for catch-and-effort data collection (EC, 2024). Despite this support, the national scientific infrastructure remains insufficient to allow for autonomous resource assessments or to sustain the development of a national system capable of justifying quotas based on scientific data.

The literature indicates that the scientific assessment of fisheries resources in Guinea-Bissau combines sporadic methodological advances with persistent structural limitations, resulting in a situation in which knowledge production relies heavily on external missions, international data collection, and regional initiatives. These limitations directly affect the country's ability to accurately assess species-specific biomass status, as such assessment requires consistent time series, continuous monitoring, and specialised analytical capabilities. As a result, management decisions are necessarily based on fragmented information, thereby compromising the effective implementation of policies grounded in stock assessments.

4.6.1 Species-Specific Biomass Status

Both the scientific literature and interviews indicate a convergent trend regarding the state of fisheries resources in Guinea-Bissau: the increasing biological vulnerability of multiple stocks, exacerbated by insufficient data and the irregularity of assessment campaigns. Although various research missions conducted by the Russian research vessel (Atlantic Research Institute of Marine Fisheries and Oceanography – AtlantNIRO), INIPO, IEO, and other institutions have produced valuable indicators, significant divergences in the consistency of time series are evident, reflecting methodological and operational limitations. In general, studies indicate that several pelagic and demersal stocks are under intense fishing pressure and that the recent deterioration of specific populations, particularly small pelagic stocks, constitutes a critical warning for regional fisheries sustainability.

The most recent results from scientific campaigns conducted by INIPO, in cooperation with IEO, and AtlantNIRO indicate significant declines in the populations of catfish (*Arius parkii*) and red pandora (*Pagellus bellottii*). However, horse mackerel (*Trachurus trecae*), historically abundant, shows increasingly irregular distribution patterns. The situation becomes more complex with mullet (*Pseudupeneus prayensis*), which was recorded by one research vessel, but was absent from another assessment, raising questions about inter-campaign comparability. According to interviewee IN01 (2025), ‘*the most critical case concerns sardinella (*Sardinella maderensis* and *Sardinella aurita* – yaiboy in crioules), a transboundary stock shared with Senegal and Guinea, whose current condition is a primary scientific concern.*’ This is due to ‘*the rapid expansion of fishmeal industries in Senegal, which convert small pelagic into animal feed for export, has intensified regional pressure on these transboundary stocks*’ IN01 (2025).

Table 4.1 shows the status of the nation’s essential high-value fishery resources, indicating that most species have biomass levels below their Biomass at Maximum Sustainable Yield (BMSY), suggesting overfishing or excessive fishing pressure. The biomass levels of octopus (*Octopus vulgaris*), cuttlefish (*Sepia hierrdda*), catfish (*Carlarius parkii*), and black hake (*Merluccius polli*) remain below their BMSY values, while their populations have continued to decrease over the past few years. The biomass of deep-water rose shrimp (*Parapenaeus longirostris*) and common pandora (*Pagellus bettottii*) exceeds BMSY, suggesting that their fishing practices maintain sustainable levels or show no significant change. The following species exist in addition to sardinella (*Sardinella spp.*). Atlantic horse mackerel (*Trachurus*

trachurus) and Atlantic chub mackerel (*Scomber colias*) are close to BMSY, suggesting near-fully exploited stocks, although uncertainties remain due to issues related to model fit.

Table 4.1 – A summary of the status of the main species of high commercial value in the country.

Species	Estimated Biomass
Octopus (<i>Octopus vulgaris</i>)	Biomass was estimated at 2,004 tonnes, well below the BMSY of 4,952 tonnes, indicating heavy exploitation. Trends fluctuated sharply: from 3,575 tonnes in 2014 to 1,713 tonnes in 2017, peaking at 8,548 tonnes in 2019, before dropping to 2,986 tonnes. These variations differ from model results, which showed a steady decline from 2010 to 2020.
Cuttlefish (<i>Sepia hierrdda</i>)	Biomass levels remain below BMSY, with a decline likely linked to increased exploitation rates, suggesting overexploitation.
Deep-water rose shrimp (<i>Parapenaeus longirostris</i>)	Biomass exceeded BMSY due to low exploitation and mortality over the past 12 years, though a decline has been noted in the last three years.
Striped red shrimp (<i>Aristeus varidens</i>)	Initially abundant and with low exploitation, biomass declined after 2010 due to increased fishing mortality. However, in recent years, it has recovered, indicating that the stock is not fully exploited.
Atlantic Horse Mackerel (<i>Trachurus trecae</i>)	The 2020 biomass (160,264 tonnes) was slightly above the BMSY (154,572 tonnes), although high interquartile ranges suggest data-model fit issues.
Sardinella (<i>Sardinella spp.</i>)	The 2020 biomass (82,363 tonnes) was marginally below the BMSY (83,598 tonnes) and fell within the confidence intervals, although model-fit issues persisted.
Atlantic chub mackerel (<i>Scomber colias</i>)	Biomass in 2020 (21,456 tonnes) was slightly below the BMSY (22,011 tonnes), indicating near-full exploitation.
Black Hake (<i>Merluccius polli</i>)	The 2020 biomass (2,646 tonnes) was substantially below the BMSY (4,323 tonnes), with significant fluctuations over time
Barbinho (<i>Galeoides decadactylus</i>)	Biomass (11,268 tonnes) falls within the BMSY confidence interval (14,067 tonnes) but has declined since 2015.
Catfish (<i>Carlarius parkii</i>)	Biomass (9,124 tonnes) is well below the BMSY (21,951 tonnes) and has declined steadily since 2015.
Goatfish (<i>Pseudupeneus prayensis</i>)	Biomass (3,781 tonnes) is slightly below BMSY (4,424 tonnes) but falls within the confidence intervals, with a post-2015 decline.
Common pandora (<i>Pagellus bettottii</i>)	Biomass (8,977 tonnes) is above BMSY (7,986 tonnes), indicating full exploitation and relative stability.

Source: Adapted from Sobrino et al. (2022). *Relatório do Comité Científico Conjunto: 8ª Reunião do Comité Científico Conjunto entre a República da Guiné-Bissau e a União Europeia*.

Regional assessments corroborate the overexploitation trend. In 2023, the Joint Scientific Committee (*Comité Científico Conjunto*) and the Fishery Committee for the Eastern Central Atlantic (CECAF) assessed stocks in Guinea-Bissau and Sierra Leone. They confirmed

overexploitation of key pelagic species, including sardinella and horse mackerel. Demersal stocks, including pink shrimp (*Penaeus notialis*), deep-water rose shrimp (*Parapenaeus longirostris*), striped red shrimp (*Aristeus varidens*), cuttlefish (*Sepia spp.*), and common octopus (*Octopus vulgaris*), were analysed using the Biomass Dynamics Model (BioDyn) and Stochastic Surplus Production in Continuous Time (SPiCT), both of which indicated high fishing mortality rates and a continuous decline in biomass (Sobrino et al., 2023).

A Bayesian assessment of two decades of catch and effort data confirmed declines in high-value commercial groups. However, the absence of age models reveals methodological limitations that reduce the accuracy of the projections (Sobrino et al., 2023). In recent campaigns, a high-resolution environmental survey conducted by the Norwegian research vessel Fridtjof Nansen in 2024 did not detect any sardinella in Guinea-Bissau’s waters, a result corroborated by the AtlantNIRO campaign of the same year.

Considering these trends, the Ministry of Fisheries has initiated preliminary steps to adopt an MSY-based TAC regime, following models applied in Mauritania and Senegal. However, the full operationalisation of this system requires legal reforms, institutional restructuring, and enhanced enforcement capacity, all of which are currently under development (Sobrino et al., 2022). Comparisons of campaigns from 2014 to 2022 that use abundance indices restricted to Guinea-Bissau’s EEZ, due to a lack of information on stock identity, reveal only slight variation among recent demersal campaigns, as indicated by 2025 data collected by the DUX vessel (INIPO and IEO) and AtlantNIRO. The data in **Figure 4.4** reinforce the importance of species-specific monitoring for fisheries management within the country’s EEZ.

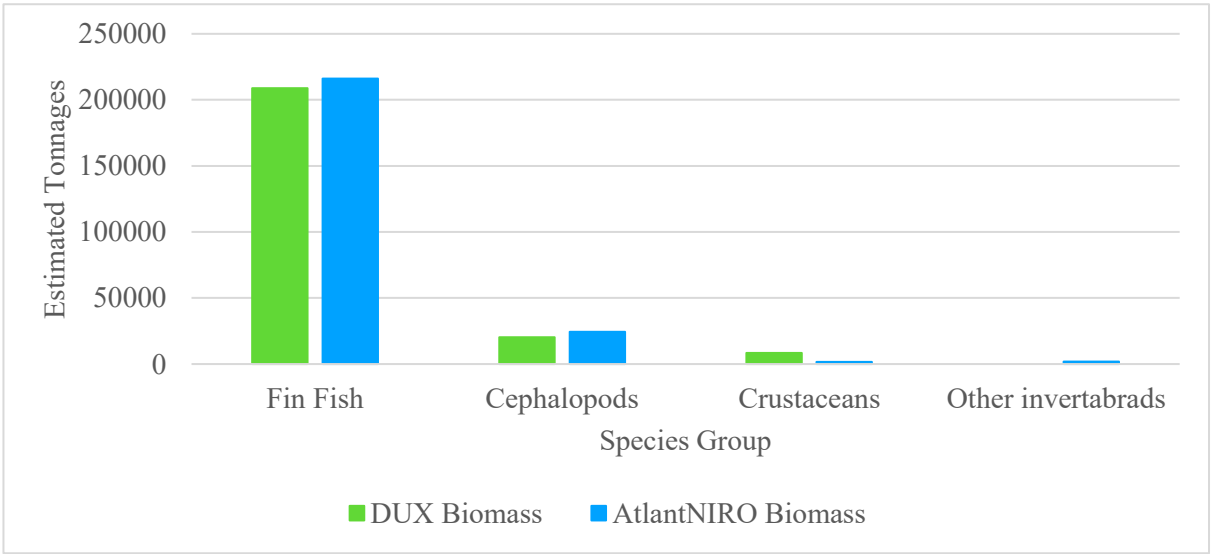


Figure 4.4 – Estimated Biomass for various species in Guinea-Bissau’s EEZ in 2025 (INIPO, 2025).

The graph presents the estimated biomass of different species in Guinea-Bissau's EEZ in 2025, highlighting firm heterogeneity among the analysed groups. Some species exhibit higher biomass, whereas others show lower biomass, indicating an uneven distribution of biological resources. This variation suggests differences in relative abundance among the species.

The reliability of assessments remains limited by underreporting of catches and the absence of systematic monitoring. Much of industrial fishing takes place abroad, hindering the collection of complete data, while artisanal fishing remains unmonitored, mainly due to logistical constraints and limited observer presence (Intchama et al., 2018). Knowledge about the abundance and ecology of elasmobranchs remains particularly scarce, with inconsistent observations at the species level and incomplete data on habitats (Leurs et al., 2021). These gaps highlight a structural misalignment between biological assessment, MSC, and the regulatory framework, compromising the capacity for evidence-based management.

The literature indicates that specific stocks in Guinea-Bissau are facing increasing pressures, exacerbated by scientific, methodological, and institutional limitations that hinder accurate assessments and effective management measures. These weaknesses have direct implications for the implementation of EBM approaches and the effectiveness of MPAs, as both depend on a comprehensive understanding of ecological interactions, population dynamics, and cumulative pressures on ecosystems. Without reliable data on stock status and without institutional capacity to integrate biological, environmental, and socioeconomic information, the understanding of ecosystem-based management remains limited or even unknown.

4.7 Ecosystem-Based Management and Marine Protected Areas (MPAs)

The literature and empirical research on ecosystem management and MPAs in Guinea-Bissau highlight a dynamic framework in which conservation, traditional uses, and external pressures coexist in tension. Studies converge in showing that MPAs should not function as adaptive laboratories integrated into a broader socio-ecological mosaic, articulating conservation, artisanal fishing, and mangrove protection (Campredon & Cuq, 2001; Chuku et al., 2022). However, disagreements arise over the effectiveness of co-management models, which are often dependent on external funding and vulnerable to governmental instability.

Mangroves and coastal wetlands constitute one of the pillars of ecosystem management in Guinea-Bissau, encompassing more than 495,000 hectares of Ramsar sites in West Africa and having high potential for sustainable shellfish production (Chuku et al., 2022). The national approach to Integrated Coastal Zone Management (ICZM) has prioritised MPAs and mangrove ecosystems (Campredon & Cuq, 2001). Additionally, they are central to fisheries productivity, ecological resilience, and biodiversity conservation. According to interviewee IN04 (2025), *‘although financial resources are limited and MPAs do not receive direct state funding, international partnerships have enabled remarkable conservation results. For example, manatee (Trichechus manatus) populations, declining in other countries, persist in Formosa Island, and degraded intertidal zones have been recovered, favouring bird populations and ecological processes, which are essential to mangrove regeneration.’*

The institutional framework for MPAs is defined by IBAP, which integrates international commitments, including the Abidjan Convention, which reinforces standards for ecosystem protection, pollution control, and sustainable management (Osemwegie et al., 2021). Regional bodies, such as the Regional Coastal and Marine Partnership (PRCM) and the Regional Network of Marine Protected Areas in West Africa (RAMPAO), the interviewee IN04 (2025), stated that *‘shared governance fosters stewardship of shared ecosystems, emphasising the migratory nature of marine species and the need for governance that extends beyond individual national borders.’* This integration aligns with global goals, such as Aichi Target 11 and SDG 14.5, which call for the protection of 10% of marine areas. According to interviewee IN04 (2025), *‘Guinea-Bissau already exceeds these objectives, with 12.4% of its marine area and 13.9% of its terrestrial area protected, aligning with the global target of 30% by 2030.’*

Despite these advances, socioeconomic challenges remain. The National Environmental Management Plan sets strategic guidelines for sustainability and participatory governance (Nakamura & Amador, 2022). However, the fisheries sector remains fragmented. The 2005 Management Plan for the Community Marine Protected Areas of Formoso, Nago, and Chediã in Bijagós Island seeks to articulate traditional fishing methods with conservation mechanisms. However, tensions arise when local fishermen enter into informal agreements with industrial or semi-industrial fleets to operate under national names, thereby weakening management standards and generating illicit access flows within protected areas.

The situation regarding mangrove exploitation worsened when timber extraction for the establishment of rice paddies and domestic consumption, which had always been moderate (IN04, 2025), increased because of the growth of fish processing camps destined for external markets, leading to significant increases in deforestation, threatening sensitive ecosystems and culturally important sites (Cross, 2016). The interviewee, collaborating with IBAP, notes that the practice of abandoning rice paddies (*bolanha* in Creole) and opening new areas rather than rehabilitating existing ones requires them to work with villages on hydrological and mangrove restoration initiatives (IN04, 2025).

Recognising that top-down conservation practices are ineffective, IBAP has increased initiatives that integrate social justice, linking ecological protection to people's livelihood diversification, supporting women in developing the small-scale processing of non-timber forest products, and improving rice systems and irrigation schemes (IN04, 2025). This reflects the understanding that resource users derive tangible benefits from conservation only if they participate as active co-managers rather than as regulated subjects. This approach reflects the logic expressed by the interviewee IN04 (2025), *'you can impose laws, even send armed patrols, but people will still always find a way around them if their needs are ignored.'*

Another factor is that political instability continues to disrupt long-term management trajectories. Frequent ministerial changes lead to alternating conservation-oriented strategies and extractive approaches, undermining the system's coherence. This volatility weakens the link between scientific knowledge production and political decision-making, where resource-exploitation imperatives outweigh technical sustainability advice (IN04, 2025). As a result, actions such as those involving distant-water fleets are occurring in MPA-adjacent waters using illegal small-mesh gear, further amplifying the challenge and illustrating how this context-specific situation reinforces external capital's exploitation of governance vacuums and accelerates ecological degradation, as stated by interviewee IN02 (2025).

In the scientific field, emerging tools, such as environmental DNA (eDNA) sampling, show potential for mapping the habitats of elasmobranchs and other species in estuarine and mangrove systems. Recent tests demonstrate that tidal patterns affect detection accuracy, suggesting the need for methodologies adapted to local hydrological dynamics (Leurs et al., 2023). These technologies reinforce the perspective that EBM strategies require innovation in monitoring, science, and community mechanisms.

The Literature shows that ecosystem management and MPAs in Guinea-Bissau represent a field of significant ecological progress, but one that is deeply constrained by institutional vulnerabilities, socioeconomic inequalities leading to the pressures in MPAs. These constraints are directly reflected in biodiversity status and conservation challenges. The institutional fragility and intense pressure on sensitive resources, and conflicts between conservation and livelihoods undermine the effective implementation of conservation policies.

4.8 Biodiversity Status and Conservation Challenges

The literature on the state of marine biodiversity in Guinea-Bissau indicates increasing ecological vulnerability, reflecting regional trends of sharp declines in large marine vertebrates, intensified fishing pressure, and limited spatial and functional coverage of protected areas. There is a consensus among studies that historically emblematic species, such as sawfish (*Pristis spp.*), are now extinct, while others show clear signs of severe depletion (Campredon & Cuq, 2001). However, the literature is divergent on the effectiveness of MPAs, suggesting that, given their limited distribution across vast coastal zones, conservation strategies focused on indicator species and adaptive monitoring systems may be more viable than relying exclusively on spatial conservation instruments.

The apparent local extinction of *Pristis spp.*, once common in Guinea-Bissau's waters, and the marked depletion of wedgefish (*Rhynchobatos lubberti*) are signs of the functional collapse of large benthic species. Given the limited spatial coverage of MPAs relative to the country's broader EEZ, localised reductions in fishing pressure are unlikely to produce measurable national effects. Thus, the literature points to the need for keystone species-based approaches, integrating continuous monitoring of culturally significant groups, such as sawfish, guitarfish, and sharks (Baran & Tous, 2000). Effective conservation must prioritise local awareness, the valorisation of traditional stewardship practices, and long-term community-based management systems, rather than relying solely on externally designed regulatory frameworks.

Recent advances in hybrid monitoring methods demonstrate the potential of integrating fisheries-dependent data, local knowledge, and genomic tools, such as environmental DNA (eDNA). In a study conducted in the Bijagós Archipelago, Leurs et al. (2023) identified DNA from 13 elasmobranch species, half of which were listed as threatened by the IUCN. The most frequently detected species were the pearl whipray (*Fontitrygon margarita*, ~18.9 % of reads),

the smalltooth stingray (*Hypanus rudis*, 14.2 %), the hammerhead shark (*Sphyrna lewini*, 12.6 %), and the blackchin guitarfish (*Glaucostegus cemiculus*, 11.8 %). Urock and Orango were the locations where the ordinary African cownose ray (*Rhinoptera peli*) and marbled stingray (*Dasyatis marmorata*) were recorded. These patterns diverge from fisheries observer data, where landings were dominated by milk shark (*Rhizoprionodon acutus*), daisy whipray (*Fontitrygon margarita*), blackchin guitarfish, scalloped hammerhead shark, and Seret's butterfly ray (*Gymnura sereti*). This reveals a pronounced misalignment between the presence-detection data and the catch-pressure records. Eight species appear in both lists; eDNA detects five; and eight are recorded in landing records, underscoring the need to integrate genomic insights with fisheries-dependent data to improve stock and habitat assessments.

The eDNA survey, based on the International Union for Conservation of Nature (IUCN) classifications, detected seven threatened species, including the Critically Endangered taxa: *Sphyrna lewini*, *Glaucostegus cemiculus*, *Rhinoptera margarita*, and *Hypanus rudis*. The observer data revealed seven additional threatened species, including *Carcharhinus timburus*, *Bathytoshia lata*, and *Ginglymostoma cirratum*. In their study, Leurs et al. (2023) conclude that conventional monitoring systems significantly underestimate the true diversity and presence of endangered species. Nakamura & Amador (2022) urge the implementation of the National Strategy for Protected Areas and Biodiversity 2014-2020, which requires greater coordination among IBAP, fisheries governance authorities, and adaptive management systems for MPAs.

The spatial dynamics of threatened species reinforce regional challenges. Elasmobranchs detected in Guinea-Bissau exhibit distribution patterns that coincide with areas of greater fishing effort in Mauritania's EEZ, reflecting the regional migratory nature of these species (Leurs et al., 2021). Intensive fishing in the buffer zones of the Bijagós Archipelago and the Banc d'Arguin National Park (PNBA) disrupts essential ecological corridors, reducing connectivity and increasing species vulnerability. The seasonal changes identified by Leurs et al. (2023) also influence the likelihood of scientific detection, suggesting that threat status alone is insufficient to determine conservation priorities. Instead, MPAs should be designed as nodes in a regional ecological network, adjusting boundaries, rules, and monitoring efforts to the dynamic behaviour of species. The literature indicates that the state of coastal and marine biodiversity in the country faces severe challenges, characterised by increasing regional pressures. Evidence indicates the need to integrate emerging technologies, regional management approaches to protect threatened species, and local communities' knowledge.

4.9 Guinea-Bissau and the EU Fishery Agreement

The literature and empirical research on EU-Guinea-Bissau SFPAs are marked by economic dependence and structural power imbalances. Studies converge in showing that these agreements function as important sources of revenue for Guinea-Bissau. However, perpetuates a rentier model that weakens the national capacity to develop a domestic value chain and reinforces extractive practices by distant-water fleets (Kaczynski & Looney, 2000; Okafor-Yarwood & Belhabib, 2020). Although SFPAs are framed by the EU as instruments of sustainable management, the literature highlights persistent contradictions between the principles of the CFP, the commitments of the SDGs, and the actual patterns of exploitation.

The economic model associated with SFPAs highlights this inequality. Approximately 90% of the added value from EU fishing activities results from access fees and sectoral support payments, while only 10% remains in the national economy, mainly in the wages of a limited number of Guinea-Bissau's seafarers employed on the EU vessels (EC, 2024). This pattern demonstrates that the national fishing economy operates on external flows rather than on the endogenous development of a local processing industry (Kaczynski & Looney, 2000).

Despite the rhetoric of sustainability, evidence indicates misalignment between financial compensation and resource exploitation. Between 2010 and 2014, EU vessels caught 7% of already overexploited species, 21% of fully exploited species, and 14% of species whose fishing pressure was unknown, violating the EU's commitment to operate within MSY limits by 2020 (Okafor-Yarwood & Belhabib, 2020). These patterns, combined with extraction in areas of limited enforcement, directly affect local communities and undermine the targets of multiple SDGs, including poverty reduction, food security, health and education, gender equality, economic growth, and ocean resource sustainability (SDGs 1, 2, 3, 4, 5, 8, and 14).

The global market context exacerbates this asymmetry: many countries have adopted policies restricting the export of unprocessed resources, whereas most West African states lack the capacity to develop processing chains. Although SFPAs include commitments to sectoral support and land-based development, these are insufficient, perpetuating a model in which revenues replace structural reforms (Kaczynski & Looney, 2000). Thus, the agreements serve as substitutes for industrial policies, reinforcing dependencies rather than fostering autonomy, as the payment of access fees replaces actual sectoral development initiatives, creating a rentier system for fisheries management rather than promoting structural change.

The 2020 Fisheries Management Plan attempts to reverse this trend, proposing TAC limits per species, reducing fleet capacity to 2,500 GT, implementing minimum mesh sizes of 70 mm, protecting threatened species, and strengthening observer systems and biological sampling (EC, 2024; Nakamura & Amador, 2022). However, implementation remains constrained by resource scarcity, inadequate monitoring, and continued reliance on external funding.

The fishing agreement between the EU and Guinea-Bissau has improved considerably in recent years, according to one interviewee (IN02, 2025). The EU presents relatively high levels of formal compliance, between 92% and 98%, and has invested in joint scientific campaigns, technical training, and testing of more selective fishing gear (EC, 2024). Additionally, *‘seven Guinea-Bissau technicians received specialised training in Spain, demonstrating some degree of capacity transfer,’* as stated by interviewee IN01 (2025). However, the interviewee IN03 (2025) acknowledged that, *‘while the European fleet operates at about 64% of its authorised capacity and is perceived as relatively more responsible, Chinese fleets account for more than 54% of catches and are associated with more intensive and less sustainable practices.’* Nevertheless, this interviewee said that he does not know whether the CFP standards applicable to EU waters are fully respected within Guinea-Bissau’s EEZ.

From a geopolitical perspective, the international context offers alternatives. The case of the Nauru Agreement Countries (NACs) in the Pacific demonstrates that regional blocs can negotiate better access rates, reduce bycatch, and strengthen Port State measures. Authors argue that the Sub-Regional Fisheries Commission (SRFC) could play a similar role in West Africa, promoting collective bargaining, regional vessel registries, and concerted enforcement mechanisms (Kaczynski & Fluharty, 2002). This regional coordination is an essential strategy for reducing external dependence and strengthening autonomy of resource management.

Both the literature and interviews indicate that fishing agreements between the EU and Guinea-Bissau combine short-term financial advantages with substantial ecological, economic, and institutional costs. These agreements reflect historical asymmetries that structure the sector and have kept the country in a dependent extractive model since the 1980s. Furthermore, they are insufficient as instruments for sustainable development in Guinea-Bissau, as they prioritise the immediate capture of revenue at the expense of conserving coastal and marine resources and strengthening national capacities and sovereignty over fisheries management.

5. Discussion

Research data, along with interview information, indicate that Guinea-Bissau faces significant challenges in resource management due to structural inequalities and disparate data systems, as well as to official statements that promote sustainability while permitting extractive activities. These dynamics do not emerge in isolation but rather in broader patterns documented in the literature on marine governance in West Africa, where external actors, weak institutional capacity, and disconnected regulatory frameworks converge to produce an extractive rent-based framework (Kaczynski & Looney, 2000; Okafor-Yarwood & Belhabib, 2020).

5.1 Artisanal fishing and Co-management

Artisanal fisheries in Guinea-Bissau are officially framed within national policy and supported internationally as a strategic livelihood sector whose sustainability depends on participatory management models and community engagement (Baran & Tous, 2000; Campredon & Cuq, 2001). However, the empirical findings reveal that co-management initiatives, including those piloted in Rio Grande de Buba and Cacheu, have produced partial inclusion while leaving intact more profound structural vulnerability, projects facilitated consultation committees and introduced seasonal bans and gear restrictions (Baran & Tous, 2000).

As described by Cross (2016), local fishermen engage in territorial conflicts with non-resident fishermen, creating competition between native and distant-water fishers who possess better fishing equipment. However, research indicates that the Bijagó and Felupe communities employ territorial arrangements and customary resource management systems (Cormier-Salem, 2017). These systems are vulnerable to external threats, weak state protection, and fragmented law enforcement. This aligns with the critique that community-based management is only effective when supported by strong institutional and judicial backing, which is largely absent in Guinea-Bissau (Baran & Tous, 2000).

The invisibility of artisanal landings, resulting from the failure to systematically document their catches, especially those landed at remote and informal sites, means that national statistics reproduce a management bias that renders small-scale extraction statistically insignificant while legitimising industrial extraction through formal reporting channels (Intchama et al., 2018). This dynamic reveals a knowledge hierarchy where what is counted becomes governable,

whereas what remains uncounted is classified as marginal or informal, despite its central role in food security and local resource economies.

5.2 Industrial Fishing and External Access Regimes

Industrial fisheries in Guinea-Bissau operate under an external access regime, with weak national control and strong infrastructural dependence, reflecting broader criticisms of neo-extractive models of the blue economy in West Africa. The expansion of fleets from distant waters, equipped with advanced technology, has transformed the EEZs into leased extraction zones, rather than sovereignly managed territories (Kaczynski & Looney, 2000). Although industrial fleets operate under official licensing agreements, the material benefits of extraction flow outward, with more than 90% of value retained abroad (EC, 2024), leaving the country in a position of rent-dependent peripheral management rather than economic emancipation.

The distant-water access agreements, especially with the EU and Asian fleets, prioritise financial compensation over ecological sustainability, reinforcing a logic of territorial leasing (Kaczynski & Fluharty, 2002; Okafor-Yarwood & Belhabib, 2020). Landing in the ports of Dakar, Abidjan, and Las Palmas highlights the weak integration of the national value chain and limited state control over its ports, which constrain internal economic and social development.

The changing industrial catch volumes from 2011 to 2017 indicate that fishing activity responds more to access agreements, subsidies, and international demand than to the state of stocks (Intchama et al., 2018; Kaczynski & Fluharty, 2002). Despite EU sectoral funds aimed at improving governance, the literature points to unstable sustainability alliances that perpetuate exploitation (EC, 2024; Okafor-Yarwood & Belhabib, 2020). For instance, allocating licenses based on GT rather than TAC allows extraction without defined catch limits.

The geopolitical asymmetry embedded in access agreements is evident in the distinction between EU fleets, which maintain a compliance-based legitimacy through observer programmes and data reporting, and Asian fleets, particularly from China, which apply more aggressive fishing strategies with minimal monitoring or scientific collaboration (IN03, 2025; Intchama et al., 2018). Yet, as Kaczynski & Fluharty (2002) warn that compliance does not equate to sustainability, as EU fleets still intensify extraction within legally permitted zones, including areas around the MPAs, as noted by (Leurs et al., 2021).

5.3 Bycatch and Ecological Invisibility

Bycatch, as evidenced in the findings, is not an accidental byproduct of industrial fishing but a structural outcome of gear selectivity, economic incentives, and weak regulation. This aligns with Kaczynski & Fluharty (2002) observation that licensing regimes and mesh size rules are designed to maximise extraction rather than minimise ecological harm. Shrimp trawlers operating with 25 mm mesh nets capture large volumes of non-target demersal species, including cephalopods, which account for up to 92% of recorded landings. The empirical finding that bycatch remained unreported until 1997 (Kaczynski & Fluharty, 2002) means that Data categories in fisheries management produce selective data, where only target species are counted, and non-target biomass becomes invisible (Sobrino et al., 2022, 2023, 2024).

The visibility policy affects threatened species, including elasmobranchs, sea turtles, and dolphins, whose ecological functions are widely documented in conservation studies (Leeney et al., 2015; Leurs et al., 2023), yet whose presence remains marginal to industrial fisheries assessment frameworks. The sharp decline in ray and shark landings between 2016 and 2018, as recorded in the findings, aligns with Leurs et al. (2021) assessment that industrial pressure is spatially concentrated around MPA buffer zones, increasing the likelihood of non-target species mortality without formal accountability. The discrepancy between observer data and eDNA detection patterns, as discussed in Leurs et al. (2023), confirms that fisheries-dependent monitoring significantly underestimates the presence and threat levels of biodiversity.

The economic value of bycatch does not represent the entire cultural and social worth, because dolphins hold sacred meaning for the Felupe and Bijagó communities, who connect them to their religious rituals and cosmic beliefs (Leeney et al., 2015). However, their incidental capture and informal consumption reflect tension between cultural respect and subsistence pressures exacerbated by resource depletion.

5.4 Shellfish Harvesting, Gender, and Estuarine Economies

The research indicates that shellfish harvesting, including mangrove oysters and estuarine species, follows gendered ecological patterns, with women responsible for most of the work and for all stages of the process, from harvesting to market distribution. This aligns with Chuku

et al. (2022), who state that women comprise 79% of shellfisheries across West Africa, where fisheries management systems fail to recognise the gendered distribution of coastal resources.

The traditional shellfish harvesting system in Guinea-Bissau operated through customary tenure, which allowed the Felupe and Bijagó communities to manage rotational fishing zones based on their religious calendar and shared land management principles (Cormier-Salem, 2017). Market integration and external commercial extraction have disrupted these systems, transforming traditional subsistence and ceremonial harvesting into commercial operations across the Bijagós Islands (IN04, 2025). This aligns with the market logic that has replaced customary authority as the dominant force in society. Cormier-Salem et al. (2010) argue that they arrived in successive waves, drawn by the abundance of mangrove resources, establishing temporary camps within these areas, which they cleared and exploited without regard for local regulations, and acting in accordance with Hardin's theory, behaving as predators or free riders.

Efforts to introduce co-management models in shellfish governance, such as the oyster tenure plots in Cacheu and Cantanhez, reflect a hybrid management experiment positioned between traditional territorial and donor-driven rationalities of the BE. While framed as empowerment, these initiatives also individualise access rights, moving away from lineage-based collective regulation toward semi-privatised stewardship, revealing an underlying neoliberal logic within co-management discourse (Chuku et al., 2022; Keleman et al., 2024).

While shellfish economies are central to food security and ritual identity in Guinea-Bissau, they remain statistically invisible, rendering women's labour relevant but institutionally unrecognised. This institutional marginalisation is not accidental but reflects gendered knowledge hierarchies, wherein national fisheries administration prioritises industrial and pelagic data regimes over estuarine, subsistence-based extraction, despite their socio-ecological importance (Cormier-Salem, 2017; Cross, 2016). The literature on mangrove socio-ecologies further suggests that ignoring women's ecological knowledge undermines conservation effectiveness, as community compliance is more likely when management aligns with ritual and customary logic rather than purely ecological metrics (Cormier-Salem et al., 2010).

5.5 IUU Fishing, MCS, and Limited Enforcement

IUU fishing is one of the most significant systematic threats to Guinea-Bissau's coastal and marine resources management, with a large proportion of industrial catches going unreported

(Intchama et al., 2018). More than an enforcement problem, it reflects the political and economic structures embedded in access agreements. The absence of sanctions for many infractions reveals a primarily symbolic control system, geared toward external legitimacy (Doumbouya et al., 2017; Okafor-Yarwood & Belhabib, 2020).

The surveillance days increased from 33 to 72 between 2013 and 2017, according to Paes & Okafor-Yarwood (2024), who explained that monitoring activities use performance metrics to demonstrate international governance compliance with EU sectoral funds donors. The patrol actions function as political statements rather than enforcement tools because they lack court oversight, have insufficient prosecution capabilities, and ineffective punishment systems. This corresponds to Mendes (2023) observations, the underlying causes of such substantial gains stem from weak oversight capacity and the presence of corruption in the fishing industry.

The findings show that patrol vessels, such as the *Okinka Pampa* and *Ocante Bunhum*, are often non-operational, and surveillance outposts in Bubaque, Cacheu, Cacine, and Caravela lack INFISCAP personnel and fuel, resulting in MCS being reduced to spatial architecture without an active State presence. The reliance on Senegalese vessels and regional joint patrol missions suggests that national enforcement is externally supported, reinforcing what literature frames as dependent sovereignty in maritime governance (Doumbouya et al., 2017; Paes & Okafor-Yarwood, 2024). MCS technologies, such as VMS and AIS, have enhanced visibility. However, Intchama et al. (2018) argues that data visibility without interception capability creates a surveillance void, in which infractions are observed but not addressed.

5.6 Scientific Evaluation, Data, and Knowledge Sovereignty

The findings demonstrate that Guinea-Bissau's coastal and marine resources science remains heavily dependent on external expectations, international observer missions, and donor-backed data-collection frameworks, with limited autonomous national capacity to sustain continuous scientific assessment. This aligns with Baran & Tous (2000), who argue that early fisheries research efforts in Guinea-Bissau were structured not primarily to strengthen national knowledge systems but to validate the potential for extraction and to design management plans that serve international access logic. The Rio Grande de Buba initiative, while a milestone in artisanal fisheries research, serves as a pilot for planning-oriented scientific intervention rather than as a sustained local knowledge infrastructure (Baran & Tous, 2000).

The Data Collection Framework indicates that EU vessels achieve 100% compliance, whereas non-EU vessels provide only limited data, highlighting the dependence of scientific visibility on geopolitical relationships (EC, 2024). This establishes a system of knowledge accessibility in which EU scientific protocols make certain species and fleets visible and controllable, while concealing non-European operations, artisanal fishing, and gendered shellfish harvesting practices (Leurs et al., 2023; Okafor-Yarwood & Belhabib, 2020). Data systems thus function as political instruments that extract value from fishing operations to legitimise quotas, licensing regimes, and access agreements for fleets from distant waters.

The use of eDNA by Leurs et al. (2023) introduces a new challenge for conventional assessment methods. EDNA-detected species not recorded in observer landings, exposing the limitations of catch-dependent monitoring systems that structure national data regimes. These scientific assessments in Guinea-Bissau remain fragmented across different knowledge systems: observer data, artisanal knowledge, eDNA signals, and customary mapping operate in parallel without integration, leading to policy measures informed by partial datasets. However, theoretically, the data not only enhance management capacity but also inform how coastal and marine resources should be managed economically, ecologically, and socially.

5.7 Ecosystem-Based Management and Marine Protected Areas (MPAs)

The country's Marine Protected Areas (MPAs) have protected species, such as manatees in Formosa, and have restored mangrove habitats in previously degraded intertidal zones. The research findings from Campredon & Cuq (2001) support ecological recovery because MPAs function as adaptive socio-ecological spaces that effectively conserve ecosystems through community involvement. The management structure of MPAs operates through external funding, which supports donor-based programs and weak institutional frameworks, as IBAP depends on international organisations' funding (IBAP, 2014; Osemwegie et al., 2021).

The donor-dependent conservation model raises serious doubts about its effectiveness. Although Guinea-Bissau has met international targets by protecting 12.4% of its marine domain, this numerical result masks fragmented governance and weak local inclusion. The results indicate that co-management in MPAs is undermined by informal agreements in which local fishermen authorise the operation of semi-industrial vessels on their behalf, circumventing conservation restrictions. According to Cross (2016) the Uno Island administration, fishermen,

maritime police units, immigration officers all appear to be competing for a stake in the control of small-scale fishing, while implementing a relatively ad hoc management initiative.

The implementation of eDNA-based biodiversity monitoring (Leurs et al., 2023) offers new ecological insights but also raises a paradox of knowledge autonomy. The latest mapping technologies enable species tracking that surpasses what human observers can detect. However, these systems operate under the control of distant-water research vessels and external laboratory supervision, creating a dependency cycle. Thus, the production of conservation knowledge mirrors extractive dependency that supports industrial fishing practices.

5.8 EU-Guinea-Bissau Fisheries Agreements and Blue Diplomacy

EU agreements are framed as instruments of sustainable partnership and capacity-building. However, they operate within a historical continuum of extraction in which Guinea-Bissau's EEZ functions as a leased maritime territory. While 20 million euros in sectoral support funds (2019-2024) (EC, 2024), the literature shows that this financial transfer substitutes for a more profound structural transformation, reinforcing what Kaczynski & Fluharty (2002) described as a compensatory management, where rents replace structural national production chains.

Under current agreements, 90% of the total value generated by EU fishing activities is captured outside Guinea-Bissau, confirming earlier patterns reported by Kaczynski & Looney (2000). While EU vessels are nominally subject to CFP-equivalent standards, the external landings to Dakar, Abidjan, and Las Palmas mean that high-value processing, traceability certification, and export benefits remain within EU and global market circuits rather than within Guinea-Bissau economic systems (EC, 2024). As Okafor-Yarwood & Belhabib (2020) argue that the CFP's sustainability discourse masks a geopolitical imperative to secure high-protein fish for EU markets, displacing ecological pressure from West African EEZ waters.

Licensing based on GT, under the 2019 and 2024 protocols, consolidates a volume-driven extractive logic, thereby allowing the maximisation of catches without quota limits. Although the EU advocates for the transition to TAC, this depends on infrastructure, validated scientific data, and EU technical assistance, conditioning sovereign management on compliance with EU standards (EC, 2024). Despite actions such as observer training and selectivity testing, representing technical cooperation (IN01, 2025; Sobrino et al., 2023). These are marginal

technical adjustments that reinforce administrative compatibility with EU governance, without altering the extraction policies. This reflects what Ertör & Hadjimichael (2020) identify as blue growth assimilation, in which peripheral states participate in global maritime governance frameworks without altering value distribution.

6. Conclusion

This study critically examined the role of MSR in the sustainable management of coastal and marine resources in Guinea-Bissau between 2000 and 2025. It evaluated how MSR supports evidence-based policy development to establish sustainable blue governance that involves all stakeholders. It shows that extractive economic operations use their control to prevent Guinea-Bissau from implementing its official sustainability plans for resource management. The national and international actors promote participatory and EBM principles. The externalisation of extraction benefits remains the primary outcome of industrial access regimes, which operate through bilateral fishing agreements to create dependency and rentier systems. The dual nature reveals that national governance systems lack strength and that scientists' professional knowledge is not effectively utilised in the official policymaking.

The survival of artisanal fisheries depends on their ability to maintain food security and generate income because they face institutional weaknesses, hidden data, and industrial and non-resident fishing operations. The access frameworks for industrial fisheries enable distant-water fleets to operate through financial compensation systems that do not focus on environmental protection. The industrial fishing sector operates under external control, which perpetuates inequitable power dynamics that benefit external investors while harming local fishing communities. Furthermore, resource assessments continue to face difficulties because bycatch and unreported catches remain problems that affect both fish stock evaluations and wildlife conservation efforts. The potential for sustainable fishing operations is constrained by excessive resource use, IUU fishing, and weak institutional structures.

Current MCS systems do not perform effective resource management because they require more robust control systems to operate properly. Despite progress supported by the EU and other international partners, notably through the SFPAs, the implementation of management policies remains highly contingent on political instability and the limited technical and scientific capacity of national institutions, such as INIPO, INFISCAP, and IBAP.

The research data indicate that MSR operations in the country require external partnerships and donor funding, as well as scientific surveys from the region, including the Fridtjof Nansen and AtlantNIRO surveys. The research collaborations have expanded understanding of marine biodiversity and resource conditions, but they have not established a permanent national research system for ongoing monitoring and enforcement. Guinea-Bissau faces obstacles to

developing evidence-based management plans for implementing TAC policies. The different institutions maintain separate data systems, lack standardised observer programs, and have insufficient national analytical resources. Moreover, the research demonstrates that sustainable resource management requires scientific methods that link policy development to community participation to address environmental, economic, and social challenges.

The research reaffirms that sustainable resource management must be grounded in scientific knowledge and integrate ecological, economic, and social dimensions. MSR should serve as a bridge between these spheres by providing data on ecosystem status, informing public policy, and enhancing informed decision-making. To achieve this, it is essential to consolidate national scientific capacity, invest in research infrastructure, and promote regional partnerships that allow information sharing and the exchange of best management practices.

6.1 Recommendations

These recommendations are based on the empirical and documentary analysis conducted throughout this research. They condense the actions that can steer the nation toward effective blue governance and the sustainable management of coastal and marine resources.

- Replacement of non-selective fishing gear, especially the elimination of drift nets during critical spawning periods, and the adoption of line fishing methods.
- Implementation of annual catch quotas for motorised pirogues, prioritising access for local communities to fishing areas.
- Adoption of an integrated management system that incorporates environmental, social, and economic dimensions, supported by TACs and quota systems.
- Development of a comprehensive national mitigation plan that covers all fishing gear and reduces bycatch.
- Updating of the political and legal framework, with a clear definition of institutional responsibilities, greater intersectoral coordination, and strengthening of regional governance.
- Strengthening of monitoring and data systems through the expansion of the observer program, international cooperation, and the creation of specific statistics for artisanal and industrial fisheries.

- Promoting co-management and community participation, with the effective inclusion of women and strengthening the legitimacy and equity of fisheries management.
- Reorienting international partnerships, especially with the EU, to generate local benefits through investment in research, infrastructure, and value chains.
- Strengthening the institutional capacity of the Ministry of Fisheries and technical agencies, ensuring specialised training and stable scientific funding.
- Integrating fisheries management into international commitments, aligning national policy with UNCLOS and the SDGs, in particular SDGs 1, 13, 14, and 17.

6.2 Study Limitations and Future Research

The study confronted a series of contextual constraints that must be acknowledged. The available literature indicates an uneven distribution across linguistic and geographic areas. Of the 26 publications included in the analysis, 21 (81%) were written in English and 5 (19%) in Portuguese, with none in French, despite French being the dominant language in West Africa. The existing language imbalance reveals a significant lack of data in Portuguese and French. The study also failed to capture the necessary local and regional knowledge that exists in unpublished sources. As a result, it failed to cover a wide range of information that could have been useful for analysing MSR's contribution to sustainable resource management. Moreover, the study became less representative because it included only a few interviewees.

The study uncovered insights that lay the groundwork for future research, which should adopt participatory, field-based approaches that integrate local community viewpoints to examine science-governance dynamics in Guinea-Bissau. Merging livelihood assessments with monitoring could yield concrete social data on marine resource management, including gender participation and the roles of traditional authorities in coastal stewardship. Thus, future research should draw on multilingual documentation systems, national stakeholder partnerships, and West African scientific networks to share knowledge and overcome current barriers.

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Appendix A – Review Protocol

Marine Scientific Research as a Mechanism for Sustainable Management of Coastal and Marine Resources in Guinea-Bissau

Background and Context

Review Questions

1. What problems identified by MSR hinder the current strategies for sustainable management of coastal and marine resources in Guinea-Bissau?
2. What recommendations has MSR given for better governance policies for managing coastal and marine resources?

Hypothesis

1. MSR has significantly shaped strategies for the sustainable management of coastal and marine resources in Guinea-Bissau.
2. MSR has contributed to inform data and the status of the resources, biodiversity, and ecosystems for better science-based governance.

Research Aim and Objectives

1. Analyse the trajectories and contributions of MSR in formulating and implementing the current strategies for sustainable management of coastal and marine resources in Guinea-Bissau from 2000 to 2025.
- ✓ Analyse the evolution of MSR and how it influences current strategies for managing coastal and marine resources by identifying and informing the problems that hinder sustainable fishery management, biodiversity conservation, and coastal ecosystems protection.
- ✓ Analyse the EU-Guinea-Bissau Sustainable Fisheries Partnership Agreements (SFPAs).
- ✓ Provide recommendations for strengthening science-based resource governance.

Methodology

1. Geographic area: Guinea-Bissau, including some West African contexts.
2. Mixed Methods: Quantitative and Qualitative methods, including semi-structured interviews.
3. Eligibility Criteria
4. Inclusion: articles, reports from Guinea-Bissau's institutions, grey literature, academic theses, and dissertations concerning the country's marine research.
5. Languages: English, Portuguese, and French.

Information Sources

1. Databases: Scopus, Web of Science, and Overton.
2. Institutional Reports from: INEP, INIPO, IBAP, IUCN, GPC, and SEPEM.
3. Grey Literature: FAO, UNDP, UNEP, and World Bank.

Search Strategy

Through the Boolean operator, search terms will include combinations of:

Through the Boolean operators, search terms will include combinations of:

1. Guinea-Bissau
2. Marine OR sea OR ocean OR coastal
3. Resource OR biodiversity OR fish OR management OR sustainable OR mangrove OR ecosystem OR invertebrate

Study Selection Process

1. Titles and abstracts will be screened for relevance
2. Full-text screening will be conducted by the researcher and consulting supervisors.

Data Extraction and Synthesis

1. The data extraction form will capture author(s), year of publication, study title, author's institution, type of study, geographic focus, objectives, methodology, and findings.
2. Narrative synthesis will be used and organised around the problems identified by MSR.

Risk of Bias and Quality Assessment

1. Scopus, Web of Science, Overton, and Reports from Guinea-Bissau's institutions will be used to assess the quality and reliability of included studies.
2. The criterion to reduce bias risk.

Appendix B – Critério de Inclusão e Exclusão

Critérios de Inclusão	Critérios de Exclusão
Estudos sobre gestão de recursos costeiros e marinhos, pescas, biodiversidade, sustentabilidade e governação oceânica	Documentos que não abordassem recursos marinhos, pescas, biodiversidade ou governação
Publicações explicitamente relacionadas com a Guiné-Bissau	Estudos que mencionassem a Guiné-Bissau fora do contexto da investigação
Estudos inseridos no contexto regional da África Ocidental, quando relevantes para a Guiné-Bissau	Trabalhos com foco exclusivo noutras regiões, sem relevância comparativa
Publicações entre 2000 e 2025	Publicações fora do período temporal definido
Artigos científicos (Scopus, Web of Science)	Documentos duplicados entre bases de dados
Literatura cinzenta (Overton)	Documentos sem contributo analítico ou empírico relevante
Relatórios nacionais e internacionais (FAO, UE, UNDP, instituições nacionais)	Estudos que não contribuíssem para responder às questões de investigação
Publicações em inglês, português e francês	Documentos sem qualidade científica

Appendix C – Interview Protocol

Eu, **Djone Camala**, estudante do Mestrado em Governação e Sustentabilidade do Mar, no Instituto Universitário de Lisboa (ISCTE-IUL), em Portugal. Estou a realizar o trabalho de campo para a minha dissertação de mestrado, cujo título é “*Investigação Científica Marinha como um Mecanismo para a Gestão Sustentável dos Recursos Costeiros e Marinhos na Guiné-Bissau*”. As informações são para uso académico e anónimo, caso o entrevistado assim o deseje.

1. Introdução

- Nome e cargo: _____
- Instituição/Organização/Projeto: _____
- Percorso académico: _____
- Área de especialização: _____
- Profissão: _____

2. Pesca Artesanal

- Principais problemas enfrentados pela pesca artesanal.
- Contribuição das práticas ilegais para o aumento da pobreza e da insegurança alimentar nas comunidades costeiras.
- O impacto dos problemas de monitoramento associados à escassez de registo das capturas na compreensão da real situação da pesca artesanal para a economia e segurança alimentar?
- Os mecanismos que poderiam ser implementados para aprimorar a coleta de dados sobre a pesca artesanal na Guiné-Bissau.

3. Pesca Industrial

- Caracterização das atividades de pesca artesanal e industrial.
- Influência da histórica predominância das frotas industriais não nacionais na gestão e uso sustentável dos recursos marinhos na Guiné-Bissau.
- Principais fatores que levaram ao aumento das capturas industriais na Guiné-Bissau e, em geral, na África Ocidental.
- Os países e as frotas que dominam a pesca industrial na ZEE da Guiné-Bissau nesse período, bem como a distribuição das quotas de captura.
- O impacto da pesca industrial em áreas próximas às zonas de biodiversidade e às AMPs.
- Quais as consequências das capturas de elasmobrânquios (tubarões e raias) na pesca industrial nas águas da Guiné-Bissau?
- Quais são os riscos ecológicos e de governança associados à alta intensidade de pesca em áreas sensíveis da ZEE do país?
- O fenómeno de transbordo na pesca industrial nas águas sob a jurisdição nacional.

4. Captura Acessória

- Os navios licenciados para a pesca de uma espécie direcionam a maior parte das capturas a outras espécies.
- Consequências da ausência de um regulamento eficaz sobre a captura acessória nos acordos de pesca com a UE e com outros países com a Guiné-Bissau.
- Como a estrutura de taxas de licenciamento subsidiada pela UE contribui para a sobreexploração dos recursos pesqueiros do país?
- Avaliação das capturas acessórias de espécies vulneráveis, como tartarugas marinhas, golfinhos, dada a falta de dados atualizados.
- Que medidas regulatórias poderiam reduzir a mortalidade acidental de espécies vulneráveis (golfinhos, tubarões e tartarugas) nas pescarias industriais?
- Integração de conhecimentos ecológicos locais e de dados científicos para a gestão sustentável da captura acessória.

5. Coleta de mariscos

- Impactos ecológicos das diferentes técnicas de extração de ostras de mangal (corte de raízes, agitação, destripping) sobre os ecossistemas de mangal.
- Em que medida a regra que rege a venda de mariscos no Arquipélago dos Bijagós contribui para reduzir a sobreexploração dos mangais?
- Fatores que intensificam a pressão sobre os recursos de mangal no país.
- Adaptação de experiências de cogestão de mariscos no Gana e na Gâmbia.
- Papel desempenhado pelas organizações locais, como a Tiniguena, na articulação entre biodiversidade, diversidade cultural, segurança alimentar e fortalecimento comunitário.
- Combinação de fatores naturais e antropogénicos no aumento da pressão sobre os ecossistemas costeiros.

6. Pesca Ilegal, Não Declarada e Não Regulamentada (INN)

- Barreiras institucionais e logísticas que impedem as autoridades nacionais de sancionar eficazmente as infrações relacionadas com a pesca INN.
- Consequências económicas da pesca INN para a Guiné-Bissau e forma como estas perdas afetam as estratégias nacionais de desenvolvimento.
- De que forma as atividades pesqueiras da UE na Guiné-Bissau se alinham ou entram em contradição com os princípios do regulamento europeu contra INN e da Política Comum das Pescas (PCP)?
- De que forma a fraca governação na Guiné-Bissau aumenta a vulnerabilidade perante as frotas de países e de atores domésticos envolvidos na pesca INN?
- A comparação das tendências de pesca INN na Guiné-Bissau com as de outros Estados costeiros da África Ocidental: em termos de frequência; aplicação de sanções; perdas económicas.
- O papel da cooperação regional e internacional na redução da pesca INN nas águas partilhadas da África Ocidental.

7. Sistema de Monitoramento, Controle e Vigilância de Atividades de Pesca
 - Como podem os sistemas de Monitoramento, Controle e Vigilância (MCV) ser reforçados para melhorar o registo das capturas industriais e artesanais?
 - Como os dados de sistemas de monitoramento e de pesca podem ser melhor integrados para reforçar a gestão sustentável da pesca?
 - Como as limitações operacionais (recursos financeiros, tecnológicos e humanos) afetam a capacidade de monitoramento das pescas industriais e artesanais na Guiné-Bissau?
 - De que forma a falta de autonomia financeira e de recursos insuficientes nos institutos nacionais (INFISCAP, INIPO) compromete a eficácia das ações de MCV?
 - A dependência de tecnologia (VMS, AIS e GPS), incluindo a locação de embarcações a países vizinhos, influencia a capacidade de reação diante de infrações de pesca INN.
 - Por que a monitoração da pesca artesanal parece mais eficaz do que a industrial, apesar do baixo número de pirogas licenciadas apreendidas anualmente?
 - De que forma os dados obtidos por VMS e AIS podem ser convertidos em ações de fiscalização eficazes, considerando as limitações das patrulhas e das inspeções?
 - O papel dos projetos regionais, como PESCAO, WARPF e WATF, na mitigação das lacunas de fiscalização no contexto da Guiné-Bissau.
8. Estado dos recursos pesqueiros na Guiné-Bissau
 - Como é que o INIPO contribuiu para o desenvolvimento estrutural da investigação científica sobre os recursos marinhos na Guiné-Bissau?
 - De que forma a capacitação de técnicos biológicos e de observadores influencia a gestão sustentável dos recursos pesqueiros?
 - Contribuição do uso do modelo de produção dinâmica de Schaefer, com estatística bayesiana, para estimar o estado de exploração dos recursos haliêuticos na ZEE do país?
 - Quais desafios surgem ao restringir a avaliação de stocks à ZEE, devido à limitação de informações sobre stocks de diferentes espécies pelágicas e demersais?
9. Sobreexploração dos recursos
 - Impacto das atividades subsidiadas da frota da UE na sobreexploração dos recursos pesqueiros na Guiné-Bissau.
 - Estado de exploração das espécies-alvo da frota da UE na Guiné-Bissau (sobreexploração, totalmente exploradas ou com estado indeterminado).
 - Como é que a sobreexploração dos recursos marinhos e costeiros impacta a capacidade da Guiné-Bissau de alcançar os Objetivos de Desenvolvimento Sustentável (SDGs), sobretudo os relacionados com a pobreza, a segurança alimentar, a saúde, a educação, a igualdade de género, o crescimento económico e o uso sustentável dos oceanos?
 - Reformas institucionais e de governança seriam necessárias para proteger os recursos marinhos e costeiros da Guiné-Bissau e assegurar sua sustentabilidade.

10. Ecossistemas Costeiros

- O papel das Áreas Marinhas Protegidas (MPAs) na Gestão Integrada de Zonas Costeiras (ICZM) na Guiné-Bissau e na África Ocidental.
- Experiências regionais ou internacionais podem servir de modelo para gestão de recursos em MPAs, como no caso do Arquipélago dos Bijagós.
- Como a implementação de planos de gestão comunitários, como os das Ilhas de Formosa, Nago e Chediã, contribui para a segurança alimentar, a conservação da biodiversidade e a capacitação de atores locais?
- Papel dos pescadores artesanais, de subsistência e outros atores locais na gestão sustentável dos ecossistemas costeiros.
- O impacto da exploração de mangais afeta a sustentabilidade dos ecossistemas costeiros?
- Eficácia das designações internacionais, como Ramsar e Reservas da Biosfera, na regulamentação concreta da coleta de mariscos e da gestão dos mangais na Guiné-Bissau.
- Iniciativas experimentais, como a ostricultura no Parque Natural dos Tarrafes do Rio Cacheu (PNTC), contribuem para a sustentabilidade da coleta de ostras e para a conservação do mangal.

11. Conservação da Biodiversidade

- As espécies marinhas mais ameaçadas e o estado atual de suas populações?
- Estratégias de conservação local mais adequadas para proteger espécies críticas.
- Melhoria da conservação da biodiversidade, integrando MPAs à gestão pesqueira.
- Importância de combinar diferentes fontes de dados para monitorar efetivamente espécies ameaçadas e garantir decisões de gestão baseadas em evidências.

12. Estratégias de gestão sustentável dos recursos marinhos e costeiros

- Como o Plano de Gestão de Recursos Haliêuticos de 2020 promove a exploração sustentável dos recursos pesqueiros na ZEE da Guiné-Bissau?
- Qual é a eficácia das medidas do Plano de Gestão de Recursos, como o monitoramento de estoques, a regulação do esforço de pesca, os limites de captura acidental e a proibição da pesca de espécies ameaçadas, na conservação das populações de peixes?
- Desafios na coleta de dados sobre capturas pesqueiras na ZEE da Guiné-Bissau, devido a lacunas e inconsistências no registo de algumas embarcações.
- Qual é a diferença na qualidade e cobertura dos dados entre as embarcações da EU e as demais frotas, e quais fatores explicam essas diferenças?
- O papel dos comitês científicos internacionais, como o ICCAT e o COPACE, na análise e interpretação dos dados de pesca da Guiné-Bissau.
- Contribuição dos fundos de apoio setoriais (21% do orçamento), destinados ao fortalecimento do INIPO, para a melhoria da capacidade de coleta e de análise científica dos recursos marinhos e costeiros.

- Você acredita que o país está no caminho certo para atingir uma governança sustentável dos recursos marinhos, tendo como um dos mecanismos a investigação marinha?

13. Acordo de Pesca entre a Guiné-Bissau e a UE

- Medidas que estão sendo implementadas para garantir a sustentabilidade, como quotas de captura, regulamentos sobre captura acessória e restrições a práticas destrutivas.
- Conformidade entre as práticas da UE na Guiné-Bissau e os padrões de sustentabilidade aplicados à sua ZEE.
- O papel do apoio setorial da UE no fortalecimento da capacidade institucional, no monitoramento científico e na implementação de políticas de pesca sustentável.
- Afeto à avaliação de exploração sustentável dos recursos, dadas as limitações dos dados disponíveis sobre a pesca industrial.
- De que forma a experiência da Guiné-Bissau se compara com a de outros países da África Ocidental na gestão sustentável de recursos marinhos e costeiros?

14. Perspetivas futuras e recomendações

- O futuro da investigação marinha na Guiné-Bissau.
- Mensagem para gestores, cientistas ou decisores políticos interessados na gestão sustentável e na governança dos recursos marinhos e costeiros.

15. Encerramento.

- Algo para explorar mais sobre os diferentes assuntos abordados.
- Agradecimento.

E-mail: djonemariocamalaa@gmail.com

Appendix D – Informed Consent Form

Eu, Djone Camala, estudante do Mestrado em Governação e Sustentabilidade do Mar, no Instituto Universitário de Lisboa (ISCTE-IUL), em Portugal. Estou a realizar a investigação de campo para a minha dissertação, cujo título é “Investigação Científica Marinha como um Mecanismo para a *Gestão Sustentável dos Recursos Marinhos na Guiné-Bissau*”.

O presente termo de consentimento informado tem por objetivo esclarecer a natureza e os propósitos da investigação, garantindo que os participantes compreendam sua participação e possam tomar uma decisão voluntária e consciente. Portanto, este trabalho busca compreender o papel da investigação científica marinha na gestão sustentável dos recursos marinhos na Guiné-Bissau, por meio de entrevistas semiestruturadas com peritos em investigação científica marinha e com gestores de recursos marinhos e costeiros.

Os participantes serão convidados a participar de uma entrevista semiestruturada, que poderá ocorrer presencialmente ou por meio de plataformas digitais. As entrevistas serão gravadas, mediante autorização do participante, para posterior transcrição e análise. De salientar que, os dados coletados serão utilizados exclusivamente para fins académicos. Portanto, a identidade dos participantes será mantida em segredo, podendo os nomes ser substituídos por códigos. Os registos e transcrições das entrevistas serão armazenados em ambiente seguro, acessíveis apenas ao investigador e, posteriormente, apagados.

Os dados podem contribuir para um melhor entendimento da governança marinha e da gestão sustentável dos recursos marinhos na Guiné-Bissau, beneficiando as políticas e práticas futuras. Sendo a participação inteiramente voluntária, o participante pode recusar-se a responder a qualquer questão, sem necessidade de justificativa e sem prejuízo de qualquer natureza.

Em caso de dúvidas ou necessidade de esclarecimentos adicionais, os participantes podem entrar em contato com o investigador por e-mail: djonemariocamalaa@gmail.com

Declaro que fui informado(a) sobre os objetivos, procedimentos, benefícios da investigação e compreendi as informações fornecidas e concordo voluntariamente em participar da mesma.

Nome do Participante: _____ / Assinatura: _____

Data: ____ / ____ / ____

Appendix E – Data Extraction in Excel

Number	Author (s)	Year of Publication	Study Title
1	Kaczynski, V. M. & Looney, S. W.	2000	Coastal Resources as an Engine of Economic Growth and Reduction of Poverty in West Africa: Policy Considerations
2	Baran, E. & Tous, P.	2000	Artisanal fishing, sustainable development, and co-management of resources: analysis of a successful project in West Africa
3	Campredon, P. & Cuq, F.	2001	Artisanal fishing and coastal conservation in West Africa
4	Kaczynski, V. M. & Fluharty, D. L.	2002	European policies in West Africa: who benefits from fisheries agreements?
5	Cormier-Salem, M-C. et al.	2010	Mangrove System Sustainability: Public Incentives and Local Strategies in West Africa
6	Leeney, R. H. et al.	2015	Food, pharmacy, friend? Bycatch, direct take, and consumption of dolphins in West Africa
7	Cross, H.	2016	Displacement, disempowerment and corruption: Challenges at the interface of fisheries, management and conservation in the Bijagós Archipelago, Guinea-Bissau
8	Cormier-Salem, M-C.	2017	Let the Women Harvest the Mangrove: Carbon Policy and Environmental Injustice
9	Doumbouya, A. et al.	2017	Assessing the Effectiveness of Monitoring Control and Surveillance of Illegal Fishing: The Case of West Africa
10	Intchama, J. F. et al.	2018	Assessing Guinea-Bissau's Legal and Illegal Unreported and Unregulated Fisheries and the Surveillance Efforts to Tackle Them
11	CIPA	2019	Plano de Gestão dos Recursos Haliêuticos Para 2020
12	FAO	2020	Fight against illegal, unreported and unregulated fishing in West Africa: a regional challenge

13	Okafor-Yarwooda, I. & Belhabib, D.	2020	The duplicity of the European Union Common Fisheries Policy in third countries: Evidence from the Gulf of Guinea
14	Leurs, G. et al.	2021	Industrial Fishing Near West African Marine Protected Areas and Its Potential Effects on Mobile Marine Predators
15	Osemwegie, I.	2021	Diagnostic analysis of the Canary Current System of West Africa: the need for a paradigm shift to proactive natural resource management
16	Nakamura, J.N. & Amador, T.	2022	Legal report on the ecosystem approach to fisheries in Guinea-Bissau – An analysis of the ecosystem approach to fisheries in selected national policy and legal instruments of Guinea-Bissau
17	Chuku, E. O. et al.	2022	Spotlighting Women-Led Fisheries Livelihoods Toward Sustainable Coastal Governance: The Estuarine and Mangrove Ecosystem Shellfisheries of West Africa
18	Sobrino I. et al.	2022	<i>Relatório da 8ª reunião do Comité Científico Conjunto sobre o Acordo de Parceria para Pesca Sustentável entre a República da Guiné-Bissau e a União Europeia</i>
19	Sobrino I. et al.	2023	<i>Relatório da 9ª reunião do Comité Científico Conjunto sobre o Acordo de Parceria para Pesca Sustentável entre a República da Guiné-Bissau e a União Europeia</i>
20	Leurs, G. et al.	2023	Addressing the data deficiency of threatened sharks and rays in a highly dynamic coastal ecosystem using environmental DNA
21	Schilling, C. de la H. et al.	2023	Nowhere to hide: Sea turtle bycatch in Northwest Africa
22	EU	2024	Commission Staff Working Document Evaluation of the Protocol to the Fisheries Partnership Agreement between the European Union and Guinea-Bissau
23	Paes, L. De O. & Okafor-Yarwood, I.	2024	Techno-optimism versus techno-reality: an analysis of internationally funded technological solutions against illegal, unreported, and unregulated (IUU) fishing in Ghana and Guinea-Bissau

24	Keleman, P-J. et al.	2024	Drifting Away from the Roots: Genderfluidity as Diola's Mangrove Fishing Strategies in Three Island-Villages of Northern Guinea-Bissau
25	Sobrino I. et al.	2024	<i>Relatório do Comité Científico Conjunto 10.ª Reunião do Comité Científico Conjunto entre a República da Guiné-Bissau e a União Europeia</i>
26	INIPO	2025	Plano de Gestão dos Recursos Haliêuticos para 2025

Number	Author's Institution	Type of Study	Geographic Focus
1	School of Marine Affairs, University of Washington, Seattle, Washington, USA	Policy-oriented applied economic study on natural resource management	West Africa and Guinea-Bissau
2	IUCN - International Union for Conservation of Nature	Project evaluation and applied research	Rio Grande de Buba, Guinea-Bissau
3	Fondation Internationale du Banc d'Arguin, Station Biologique de la Tour du Valat, Le Sambuc, 13200 Arles, France	Descriptive and analytical study	West Africa coast (Guinea-Bissau and Mauritania)
4	School of Marine Affairs, College of Ocean and Fishery Sciences, University of Washington, 3707 Brooklyn Avenue NE, Seattle, WA 98105 6715, USA	Empirical evaluation and policy analysis	West Africa (Mauritania, Senegal, Gambia, Guinea-Bissau, Republic of Guinea)
5	Institute of Research for Development (IRD), Paris, France	Comparative case study and policy analysis	West Africa, specifically the Saloum Delta Biosphere Reserve (Senegal) and the Bolama Bijagós Biosphere Reserve (Guinea-Bissau)
6	Benguela Research & Training, Walvis Bay, Namibia	Comparative analysis	West Africa (The Gambia, Senegal, and Guinea-Bissau)
7	University College London: London, GB	Qualitative anthropological case study	Bijagós Archipelago, Guinea-Bissau
8	Unité Patrimoines Locaux et Gouvernance (PALOC, UMR 208), Sorbonne Universités, IRD, MNHN, Département HNS, 57 rue Cuvier, CP 51, 75231 Paris, CEDEX 05, France	Political ecology and qualitative case study	Upper Guinean Coast (Senegal, Guinea-Bissau, Saloum Delta)
9	Centre National des Sciences Halieutiques de Boussoura, Conakry, Guinea	Qualitative policy analysis and regional assessment	West Africa (Mauritania, Senegal, Gambia, Guinea-Bissau, the Republic of Guinea, and Sierra Leone)

10	Centre of Applied Fisheries Research (CIPA), Bissau, Guinea-Bissau	Empirical analysis and data reconstruction of IUU fisheries and MCS effectiveness	Guinea-Bissau EEZ (industrial and small-scale sectors)
11	Centro de Investigação Pesqueira Aplicada	Fisheries management plan and policy document	Guinea-Bissau's EEZ and coastal zones
12	Food and Agriculture Organisation of the United Nations	Regional policy analysis and technical report	Canary Current Large Marine Ecosystem (CCLME) region, including Guinea-Bissau
13	African Leadership Centre, King's College London, United Kingdom; Ecotrust, Vancouver, Canada	Policy critique and empirical analysis	West Africa (especially Guinea-Bissau and Liberia), with emphasis on EU external fisheries agreements
14	Conservation Ecology Group, Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, Netherlands	Empirical analysis using AIS tracking and fisheries observer data	West Africa, specifically the Bijagós Archipelago (Guinea-Bissau) and Banc d'Arguin (Mauritania).
15	University of Bonn - Center for Development Research (ZEF) (Genscherallee 3, 53113, Bonn, Germany)	Systematic literature review and diagnostic policy analysis	Canary Current Large Marine Ecosystem (CCLME), including Guinea-Bissau
16	Food and Agriculture Organisation of the United Nations (EAF-Nansen Programme Report)	Legal and policy diagnostic assessment	Guinea-Bissau
17	Centre for Coastal Management (Africa Centre of Excellence in Coastal Resilience), University of Cape Coast, Cape Coast, Ghana		West African coast (Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Benin, and Nigeria)
18	IEO – Instituto Español de Oceanografía	Scientific advisory and fisheries stock assessment report	Guinea-Bissau's EEZ

19	IEO – Instituto Español de Oceanografía	Scientific advisory and fisheries stock assessment report under the EU-Guinea-Bissau fisheries partnership	Guinea-Bissau's EEZ
20	Conservation Ecology Group, Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, Netherlands	Empirical field study using environmental DNA (eDNA) and fisheries observer data	Bijagós Archipelago, Guinea-Bissau
21	CCMAR–Center of Marine Sciences, University of Algarve, Faro, Portugal	A Systematic Review	Northwest Africa (i.e., Cabo Verde, Guinea, Guinea–Bissau, Mauritania, Senegal, Sierra Leone, and The Gambia)
22	EC – European Commission	Official ex-ante and ex-post policy evaluation (Commission Staff Working Document)	Guinea-Bissau's EEZ and prospects of the Fisheries Partnership Agreement's current implementing protocol between the EU and Guinea-Bissau
23	Norwegian Institute of International Affairs, Oslo, Norway; School of Geography & Sustainable Development, University of St. Andrews, St. Andrews, UK	Comparative policy analysis based on project evaluation, interviews, and secondary sources	Ghana and Guinea-Bissau (West Africa)
24	Forest Research Centre, Associate Laboratory TERRA, School of Agriculture, University of Lisbon, Lisbon, Portugal	Genderfluidity in Mangrove Fishing by Diola's communities	Elalab, Elia, and Djobel (Guinea-Bissau)
25	IEO – Instituto Español de Oceanografía	Scientific advisory and fisheries stock assessment report under the EU-Guinea-Bissau fisheries partnership	Guinea-Bissau's EEZ
26	INIPO – Instituto Nacional de Investigação das Pescas e Oceanografia	Fisheries management plan and policy document	Guinea-Bissau's EEZ

Number	Study Objective	Methodology
1	This study addresses these important policy considerations, presenting the significant potential of coastal resources for the development of national economies and the improvement of welfare in the Sub-Saharan West African region.	Comparative case analysis of economic impact assessment
2	To evaluate the outcomes and replicability of a co-management project aimed at sustainable artisanal fishing and community development	Participatory IUCN biological monitoring and credit schemes.
3	To analyse the transformation in artisanal fishing practices along Banc d'Arguin and Bijagós Archipelago	Qualitative analysis
4	To evaluate the impact of EU-West Africa fishery cooperation agreements on the economic welfare of West African coastal states and the sustainability of their marine resources.	Legal/policy analysis, economic assessment, and comparison.
5	To analyse the compatibility between biodiversity conservation and socio-economic development through value-adding schemes (e.g., labelling) for mangrove-derived products, with a focus on shellfish	Ethnographic fieldwork, participatory mapping, policy analysis
6	To assess the frequency of bycatch of cetaceans, the fate of bycaught cetaceans, and any cultural significance attached to whales or dolphins in the communities visited.	Qualitative analysis (interviews with the artisanal fishers)
7	The factors driving the formation of fishing camps, relations with non-camp communities, and interactions with prominent authority groups.	Ethnographic fieldwork: household, economic, spot-check time allocation, and catch landing surveys; participant observation; semistructured interviews; focus groups; and key informant discussions
8	To analyse the impact of carbon-focused mangrove reforestation policies on local communities, particularly women shellfish harvesters, and assess their experiences through the lens of environmental justice	Ethnographic fieldwork, political ecology, discourse analysis

9	To evaluate the effectiveness of Monitoring, Control and Surveillance (MCS) systems in reducing IUU fishing, and estimate associated economic losses in West Africa between 2010 and 2016.	Cross-country indicator scoring, expert interviews, legal review
10	To estimate legal and illegal fisheries catches and assess the effectiveness of Monitoring, Control, and Surveillance (MCS) systems in Guinea-Bissau.	Vulnerability assessment, GIS, Climate data review, community consultation
11	To ensure the sustainable exploitation of fisheries resources through regulatory, biological, and operational guidelines for 2020, based on scientific data and stock assessments.	Stock assessment, effort analysis, ecosystem-based management, and scientific committee input. Utilises Catch-MSY model, scientific surveys (CIPA, IEO, ATLANTINIRO), and fisheries statistics to determine TAC and effort
12	To assess the scale, impact, and governance response to IUU fishing in West Africa, with a focus on national legal systems, monitoring capacities, and regional cooperation	Legal review, data from SRFC, case studies, comparative capacity assessment
13	To examine the contradictions between the EU's Common Fisheries Policy (CFP) and its practices in third countries under Sustainable Fisheries Partnership Agreements (SFPAs), with a focus on the Gulf of Guinea and Guinea-Bissau	Review EU legal and policy documents (CFP, SFPAs, IUU regulations).
14	To assess the spatial and temporal industrial fishing effort near MPTs and evaluate potential impacts on mobile marine predators, specifically elasmobranchs (sharks and rays)	AIS-based spatial tracking, ecological overlap modelling, and country-level assessment
15	To provide an integrative assessment of the CCLME using environmental and non-environmental indicators, identify knowledge gaps, and recommend strategies for proactive and human-centred resource governance.	Systematic literature review (2009-2020). Databases: Google Scholar, Web of Science, JSTOR
16	To evaluate how Guinea-Bissau's national policy and legal frameworks align with the Ecosystem Approach to Fisheries (EAF), using a diagnostic tool developed by FAO	Ethnographic fieldwork, semi-structured interviews, participatory mapping, and feminist analysis

17	The analysis of the shellfish exploitation in the estuarine and mangrove ecosystems of West Africa by identifying the species exploited, estimating the volume and value of the fishery, and its reliance on mangroves. Moreover, examine the gender dynamics across these regions.	A mixed-method exploratory approach was employed, comprising a social survey of shellfish stakeholders and a literature review on estuarine and mangrove ecosystem-based shellfisheries. The semi-structured survey questionnaire was designed to collect data from each country through a participatory approach, conducting interviews with key informants from various stakeholder groups, consisting primarily of the resource users (EMES harvesters)
18	To update catch and effort data, assess the status of key fisheries resources (cephalopods, demersal fish, crustaceans, small pelagic), and provide scientific advice for sustainable fisheries management under the EU-Guinea-Bissau SFPAs.	Stock assessment models, scientific campaign data, catch statistics, expert panel review
19	To analyse updated catch and effort statistics (up to 2022), assess the state of demersal, cephalopod, crustacean, and pelagic fisheries, and provide technical recommendations for the sustainable management of Guinea-Bissau's industrial fisheries.	Scientific campaign data, stock assessment models, CPUE trends, multi-fleet data effort review
20	To assess the presence, distribution, and community composition of elasmobranchs (sharks and rays) in a remote, highly dynamic coastal ecosystem using eDNA, and to compare these results with fisheries-dependent monitoring.	eDNA sampling, metabarcoding, HTS sequencing, biodiversity assessment
21	Focus was put on: (1) assessing the potential impact of bycatch on regional sea turtle populations; (2) analysing the occurrence of sea turtle bycatch by country and gear type; (3) characterising the drivers behind the retention of these species; and (4) providing recommendations to mitigate the threat posed by bycatch.	The compilation of published, peer-reviewed literature extracted from the internet repositories Google Scholar and ProQuest.
22	To assess the performance (2019-2024) and prospects of the Fisheries Partnership Agreement's current implementing protocol between the EU and Guinea-Bissau	Ex-ante and ex-post evaluation (2019-2023 period). Independent consultation under EC supervision: Document analysis. Stakeholder engagement. Internal EU databases, Scientific bodies (JSC, CECAF, ICCAT), National statistics (INIPO)

23	To analyse how internationally funded technological solutions aimed at improving Monitoring, Control, and Surveillance (MCS) are implemented in Ghana and Guinea-Bissau, and to compare the techno-optimism behind these initiatives with their real-world performance.	Interviews, focus groups, participatory mapping, and ethnographic observation.
24	To explore: (1) diverging societal coping strategies and livelihood developments in three Diola villages; (2) the primary drivers behind village-specific societal transformations; (3) social dynamics and female roles in mangrove fishing-related activities and village decision-making; and (4) the political ecology of interventions.	Three case studies of Diola women's involvement in mangrove fishing through a mixed-method approach that combines qualitative techniques and household surveys conducted between 2017 and 2023
25	Os objetivos da décima reunião do Comité Científico Conjunto foram os seguintes: (i) compilar, atualizar e analisar os dados das estatísticas de pesca até 2023 inclusive, (ii) analisar a situação dos recursos, (iii) providenciar aconselhamento científico ou recomendações, e (iv) analisar o progresso de atividades científicas e das outras tarefas monitorizadas pelo CCC.	
26	O presente Plano de Gestão de recursos haliêuticos tem como objetivo geral assegurar a exploração sustentável dos recursos pesqueiros.	

Number	Keywords	Language of the original document	Source
1	Coastal resources, developing countries, foreign fleets, Guinea-Bissau, land processing, poverty, privatisation, West Africa	English	Both
2		English	Overton
3	Banc d'Arguin Coastal Zone Management; Gam bia; Guinea-Bissau; Marine resource; Mauritania; Protected area; Rights of access; Senegal.	English	Scopus
4		English	Scopus
5		English	Scopus
6	Senegal, Gambia, Guinea-Bissau, Marine bushmeat, Local fishers' knowledge	English	Scopus
7	Guinea-Bissau, human rights, marine protected area, Orango National Park, resource management, small-scale fishing	English	Both
8	Mangrove; women; shellfish; environmental justice; grabbing	English	Web of Science
9	Illegal fishing, IUU, catches, West Africa, economic values, sanctions, offenses, Monitoring, Control, and Surveillance.	English	Web of Science
10	Illegal fishing, reconstruction data, industrial fishing, social economics, surveillance efforts	English	Scopus
11		Portuguese	Guinea-Bissau
12		English	Overton
13	Maximum Sustainable Yield, Gulf of Guinea, EU Common Fisheries Policy, IUU Regulation Fisheries Conflict	English	Web of Science
14	Fisheries, threatened species, coastal ecosystems, marine conservation, elasmobranchs, fisheries ecology.	English	Both
15	Anthropogenic disturbance, Canary Current Large Marine Ecosystem, Climate change, Land-based pollution, Productivity	English	Overton

16		English	Overton
17	Shellfish, women, livelihood, fisheries governance, co-management, estuary, mangrove, Africa	English	Web of Science
18		Portuguese	Guinea-Bissau
19		Portuguese	Guinea-Bissau
20	eDNA, Elasmobranchs, Conservation, Coastal ecology, Marine protected area, Marine biodiversity	English	Both
21	Central East Atlantic, fisheries, fishery-related mortality, incidental catch, marine conservation, marine megafauna	English	Web of Science
22		English	Overton
23	Fisheries; IUU fishing; technology; maritime governance; oceans governance; development assistance	English	Web of Science
24	Mangrove fishing, Coping strategies, Gender, Environmental history, Diola, Guinea-Bissau, West Africa	English	Both
25		Portuguese	Guinea-Bissau
26		Portuguese	Guinea-Bissau